NATURAL ENVIRONMENT RESEARCH COUNCIL
SCIENTIFIC SERVICES

OPERATIONS REPORT

OF A THEMATIC MULTISPECTRAL SCANNER SURVEY OF 36 SELECTED AREAS OF THE UNITED KINGDOM IN 3 PHASES DURING 1985

HUNTING GEOLOGY AND GEOPHYSICS LIMITED

ELSTREE WAY, BOREHAMWOOD,
HERTS. WD6 1SB
PROJECT 280 380

TEL NO.: 01-953 6161
TELEX NO.: 23517 HUNGOR G
CABLES: HUNTING BOREHAMWOOD

DECEMBER 1985

C O N T E N T S

SUMMARY

S U M M A R Y

The Natural Environment Research Council Scientific Services Division on 4th April 1985 commissioned by letter a 3 phase flying and acquisition programme during the Spring-Autumn period of 1985. This contract F3/G6/322 covered 36 individual areas of the United Kingdom where ground research projects by University and N.E.R.C. units were being conducted.

The contract period covered by this report from availability of the Daedalus equipment was limited to a 45 day period over the 3 phases as follows, Phase 1, Spring 15 days: Phase 2, Summer 15 days: Phase 3, Autumn 15 days. At the expiry of the nominated periods, contractual flying and acquisition were terminated, irrespective of whether all areas had been flown.

The aircraft used throughout the flying of the 3 periods was the Navajo Chieftain G-BBXX owned and operated by N.E.R.C. from Kidlington Airport through their handling agents C.S.E. Aviation Limited.

The following sectionalised report describes the field operation and equipment in detail, together with an area by area detail summary of areas flown throughout the three phases of the 1985 flying campaign.

P A R T 1

OPERATIONS REPORT

1. INTRODUCTION

The Thematic Scanner survey described in this report was carried out by Hunting Geology and Geophysics Limited on behalf of the Scientific Services Division of the Natural Environment Research Council (N.E.R.C.) of Swindon, Wiltshire. The 36 areas surveyed and covered by this report are the areas selected by N.E.R.C. to be flown within a maximum period of 45 days as specified in contract document F3/G6/322 of 4th April 1985.

A Piper Navajo/Chieftain aircraft, registration G-BBXX supplied by N.E.R.C. and crewed by C.S.E. Aviation Limited/ Hunting Surveys, fitted with an RC8 survey camera and a Daedalus AADS 1268 thematic scanner commenced flying operations on the 30th April 1985 (Phase 1) and was terminated on the 1st October 1985 (Phase III) with two agreed breaks.

The following report describes the operational aspects of the three periods of flying during this fourth season of N.E.R.C. AADS 1268 surveying in the United Kingdom.

2. INVOLVED PERSONNEL

i N.E.R.C. Superintending Officers

Dr. David F. Williams and Dr. Stuart J. White

ii N.E.R.C. Co-ordinator/Navigator

F.J. Cook

iii C.S.E. Aviation Ltd. Flying Crew

Captain/Pilot	H. John	24 flights
	A Gunter-Smith	21 flights
	R. Payne	1 flight

Aircraft Engineers from C.S.E. pool

iv Hunting Geology & Geophysics Ltd

AADS 1268 Engineers/Operators

	R.E. Westland	38 flights
	D.D. MacDonald	8 flights
Operations Manager	R.D. Williams	

3. FLYING OPERATIONS

3.1 Aircraft and Operational Bases

The survey was flown using the N.E.R.C. Piper Chieftain aircraft registration G-BBXX based at Kidlington (Oxford) Airport. For most of the survey flying, sorties commenced from

the aircraft home base, however night stop/landings were made at Liverpool, Swansea (2) Edinburgh (2) Humberside, Blackpool, Norwich, Prestwick, Dundee (2) East Midlands (2) and Teeside airfields during the three periods of ATM flying.

3.2 Flying Specification and Weather Tolerances

In general the areas to be flown were scattered throughout the United Kingdom and, with the exception of areas in Scotland, the Irish Sea and Bristol Channel, were flown from the aircrafts home base Kidlington. This base gave the flying crews the best possible servicing facilities, weather information and communication with N.E.R.C. at Swindon, as well as space for quick-look processing. The specifications for height, haze, cloud and flight direction were laid down by N.E.R.C. and augmented by their co-ordinator/navigator Mr. F.J.Cook. See Table 1. All day by day flight planning and any special flight permits were arranged by the C.S.E. flight crews in their capacity as aircraft operators. A total of 45 operational days was targeted for the three periods, the finally achieved total of 41.5 days flying are detailed in Table 2 pages 4 and 5.

TABLE 1

ORIGINAL GENERAL CONTRACTUAL FLYING SPECIFICATION

For the sake of continuity the original flight specifications are repeated hereunder. This specification was not conveyed to Huntings for the 1985 flying programme as its interpretation became the express responsibility of the N.E.R.C. co-ordinator/navigator.

1. Cloud

Sites can be flown in cloud free or under a complete cover of cloud. For cloud free up to 5 percent patchy cloud or shadow can be allowed. For patchy cloud the site should not be flown without clearance from the N.E.R.C. project co-ordinator.

Sites should not be flown without prior clearance where the overall luminescence is constantly varying.

2. Precipitation.

No restriction due to recent rain is necessary.

3. Wind.

Whilst calm conditions are preferable the limiting factor is likely to be turbulence effects on the aircraft.

4. Haze/Visibility

In hazy conditions the scanner operator/crew will be responsible for advising on the likely effect and which channels will be affected. The N.E.R.C. project co-ordinator will then decide. In low light conditions the scanner operator must decide if he can record a satisfactory signal by adjusting the gain.

5. Time.

Ideally all flying between 9.30 hours and 16.00 hours. However, if we get clear mornings and/or clear evenings the N.E.R.C. co-ordinator in conjunction with the crew may alter this.

General. If the aircraft flies and the weather closes in, the principal of "flying a target and see" should be adopted, rather than returning empty handed.

Photography. 30 percent forward overlap unless stated otherwise.

Radios

i) Can the crew transmit on the aircraft radio so that field teams can listen? They should transmit whilst on target and at end.

ii) The two way radios should be used as needed.

iii) Radio silence should be observed with the scanner on and the Transponder should be off. These effect the data recording.

Area covered. The scanner should be switched on for the minimum amount of recording to save data processing.

3.3 Navigation

Other than the standard aircraft navigation aids, no specific navigation equipment was added to the N.E.R.C. survey aircraft. However a survey navigator was employed and a wide angle survey camera was supplied and installed, the camera being used on specific scanner lines. Standard forward overlap was maintained throughout the survey period.

ACHIEVED FLIGHT DETAILS

AREA NO.	NAME	HEIGHT FLOWN (FT)			DIRECTION			GROUND SPEED (KMS)			NO OF RUNS			PHASE FLOWN			DATES FLOWN			CAMERA
		P1	P2	P3	P1	P2	P3	P1	P2	P3	P1	P2	P3	P1	P2	P3	P1	P2	P3	
2	ROTHAMPSTED		2600			NE			150			2			*			31/7/85		Y
3	LOCH LEVEN	13200			NW			150			1			*			11/5/85			Y
5	SWANSEA BAY	13000		9650	W		W	170		140	9		5	*		*	8/5/85		27/9/85	Y
5B	BOSHERTON LAKES		2500/ 1650			SE/ S			150/ 100			6			*			26/8/85		Y
6	THE WASH	5000	6600	6600	NW/ SE	NW/ SE	NW/ SE	170	160	110	3	3	3	*	*	*	6/5/85	25/8/85	22/9/85	Y
10	LLANILAE	13000			N/S			170			6			*			8/5/85			Y
11	BALLATER	13000		6500	EW		W	130		120	1		3	*		*	11/5/85		1/10/85	Y
12	SOUTHAMPTON	2600/ 6000			NE			130			2			*			1/5/85			
12/1	MONKS BROOK		2700			N/E			135/ 150			3			*			6/8/85 17/8/85			Y
12/2	CHANDLERS FORD	6600/ 3300	6600			NE	NE/ SW	155/ 170	120		6	3		*	*		3/5/85	17/8/85		Y
13	NEW FOREST	2600	2700	2600/ 2700	N	N/S	NE/ SW N	130/ 115	130/ 150	150	10	8	14	*	*	*	1/5/ 10/5/85	6/8/85 17/8/85	24/9/85 1/10/85	Y
13B	CHESIL BEACH		6600/ 5000			SW/ NW			125			4			*			3/8/85		Y
15	IRISH SEA	13000	5000	13000	E/W	N/S	NW/ SE	160	150	140	6	9	13	*	*	*	7/5/85	1/8/85	20/9/85	Y
15ii	RIVER CONWAY	13000			N/S			160			2			*			7/5/85			Y
16	DIDCOT	6600/ 5000			SE/ NW S, SW			170			9			*			6/5/85			Y
17	BLEWBURY	13000			N			175			4			*			6/5/85			Y
18	BAWTRY			2700/ 6600 13000			N/S			110 140			6			*			28/9/85	Y
19	BAWTRY			2700			N/S			110 140 150			5			*			26/9/85 28/9/85	Y
23	TAY ESTUARY			1800/ 2000			S			120			18			*			30/9/85	N
24	BURY ST EDMONDS		11500/ 11700	11500/ 11700		N/S	N/S		160	130 140		6	6		*	*		8/8/85	20/9/85 29/9/85	Y

TABLE 2

TABLE 2

AREA NO.	NAME	HEIGHT FLOWN (FT)			DIRECTION			GROUND SPEED (KMS)			NO OF RUNS			PHASE FLOWN			DATES FLOWN			CAMERA
		P1	P2	P3	P1	P2	P3	P1	P2	P3	P1	P2	P3	P1	P2	P3	P1	P2	P3	
25	THEOBALDS PARK		2600			E			150 160			5			*			31/7/85 8/8/85		Y
27	BALLANTRAE	13000			SE/ NE S			150			3			*			11/5/85			Y
28	M.1		1650	2500 2600 2700		N/S	NE/ NW S		120	140		3	3		*	*		25/8/85	22/9/85 26/9/85 28/9/85 29/9/85	Y
29	FURZE BROOK	6600		3300/ 6600	N		N/S NE	150		120	3		9	*		*	3/5/85		25/9/85 27/9/85	Y
30	BANGOR		6000	2400		S	NE		150	140		2	1		*	*		17/8/85	27/9/85	Y
30B	ABER			2700			E			140			1			*			27/9/85	Y
31	SUTTON BONNINGTON			1650/ 6000/ 3300/ 8000/ 5000/ 10000/ 13000			N			110/ 120/ 140			9			*			26/9/85 28/9/85	Y
32R	SWINDON	1500 2600			NW			105/ 130			2			*			30/4/85			Y
CR1.1	PLAS GOGERDDAN		3300			S			110/ 150			1			*			26/8/85		Y
CR1.2	MORFA MAWR		3300	3500		SW	E		120	110		1	2		*	*		26/8/85	27/9/85	Y
CR1.3	BRONYDD MAWR			3000			NE			110			2			*			27/9/85	Y
CR2	WELLESBOURNE		2650			N			120			1			*				8/8/85 25/8/85	Y
CR3.1	GLEN SAUGH			13500			N			130			1			*			17/9/85	Y
CR3.2	SOURHOPE			8000			W			140			1			*			30/9/85	Y
CR3.3	DUNDEE			13200			N			130			1			*			17/9/85	Y
CR30	NEW BORO FOREST			5000			NE			150			2			*			27/9/85	Y

3.4 Survey Diary, Progress and Serviceability

The following is a summary of events throughout the survey period

PHASE 1	APRIL 29TH TO MAY 11TH 1985
April 29th	General preparation of equipment.
30th	Installation of equipment in aircraft at Kidlington (Oxford) airport plus first productive flight of 1985 campaign, 2 runs over reserve site 32.
May 1st	Sortie 2 flown. 11 runs over areas 12 and 13. 3/8ths cloud at 3000 ft
2nd	No flying. Poor weather conditions
3rd	Sortie 3 flown, 8 runs over areas 29 and 12/2. Poor lumination 2/8ths cloud at 3800 feet plus haze
4th/5th	No flying. Poor weather conditions
6th	Sorties 4&5 flown. 19 runs over areas 12/2, 16 and 17. Variable cloud amounts from 1/8th to 3/8th at 5000 feet.
7th	Sorties 6&7 flown with landings at Liverpool. 9 runs over area 15. Apart from some haze, weather otherwise good.
8th	Sorties 8&9 flown with a landing at Swansea. 15 runs over areas 5 and 10. Weather good.
9th	No flying. Poor weather conditions
10th	Sortie 10 flown. 4 runs over area 13/1. Dull conditions with slight haze. 8/8th cloud cover at 3200 feet.
11th	Sortie 11 flown with landings at Edinburgh and Humberside. 7 runs over areas 11, 3 and 27. Weather conditions, clear with 3/8th cloud at 4000 feet initially and increasing, leading to the abandonment of a second sortie in the Bawtry area.

Giving a total on site days for Phase 1 acquisition of 11 days.

PHASE II	JULY 31ST TO AUGUST 27TH 1985
July 31st	Installation of equipment in aircraft at Kidlington (Oxford) airport plus first sortie of summer campaign. 5 runs over areas 2 and 25. Slight haze with generally 4/8th cloud at 3500 feet.
August 1st	Sortie 2 flown. 9 runs over area 15. 6/8 cloud at 5500 feet but more persistant to north of area thereby affecting the length of runs 7 to 9 inclusive.
2nd	No flying. Poor weather conditions.
3rd	Sortie 3 flown. 4 runs over area 13B. Clear, bright weather with 1/8th to 3/8th cloud at 5000 feet.

4th and 5th	No flying. Poor weather conditions.
6th	Sortie 4 flown. 3 runs only over areas 12 and 13. Haze and turbulance with variable cloud 1/8th to 3/8th at 3000 feet giving ground cloud shadow over area 13.
7th	No flying. Poor weather conditions.
8th	Sorties 5,6 and 7 flown with a landing at Norwich. 12 runs flown over areas 24,C2,25. Clear air conditions with 1/8th to 3/8th cloud at 3500 feet.
9th	No flying. Poor weather conditions.
10th	An attempt to fly area 17 made but aborted due poor weather-cloud. No recordings produced.
11th to 16th	No flying. Poor weather conditions.
17th	Sorties 8 and 9 flown. 18 runs over areas 12,30 and 13. Clear, smooth conditions with 1/8th to 2/8th cloud at 2500 feet. On completion of flying area 30 the aircraft transitted to Scotland, landing at Prestwick on return flight after poor conditions experienced over Ballantrae area.
25th	Sortie 10 flown. 10 runs over areas 6,28 and CR2. Clear, fairly bright conditions with 1/8th to 3/8th cloud building at 3000 feet.
26th	Sorties 11 and 12 flown. 11 runs flown over areas 5B and CR1. Fairly bright, smooth conditions with variable cloud 2/8th to 7/8th persisting at 3500 feet. A landing was made at Swansea airport at 11.00 hours.
27th	Poor weather conditions no flying. Crew stood down at 15.30 hours and equipment removed at 17.00 hours.

Giving a total on site days for Phase II Acquisition of 14.5 days and 13 days standby.

During the period between phase II and III the aircraft underwent a service period and latterly flew photo cover over nominated river esturies.

PHASE III SEPTEMBER 13TH TO 1ST OCTOBER 1985

September 13th	Installation of ATM equipment in aircraft at Kidlington (Oxford) airport. An attempted sortie over area 29 was aborted at 15.30 hours due poor weather conditions.
14th	No flying. Poor weather conditions.
15th	An attempted sortie was aborted after 1 hour 25 minutes flying due poor weather conditions.
17th	Sorties 1 and 2 flown with a landing at Dundee. 2 runs over area CR3 followed by a transit back to Kidlington. Bright clear conditions, 1/8th cloud at 5000 feet.
18th and 19th	No flying. Poor weather conditions.

20th	Sorties 3 and 4 flown. 17 runs over areas 15 and 24. Generally dull/clear conditions with 7/8th cloud at 18,000 feet.
21st	No flying. Poor weather conditions.
22nd	Sortie 5 flown. 1 run over area 28. Bright clear conditions with 2/8th cloud at 3500 feet.
25th	Sortie 7 flown. 6 runs over area 29. Slight haze 4/8th cloud at 5000 feet.
26th	Sortie 8 flown. 5 runs over areas 19,28 and 31. Fairly bright with haze and 3/8th cloud at 3000 feet.
27th	Sorties 9 and 10 flown with a landing at Swansea. 17 runs over areas 29,5,CR1,CR30 and 30B. Bright, hazy conditions with zero cloud.
28th	Sorties 11 and 12 flown with a landing at East Midlands airport. 21 runs over areas 31,18,19,28 and 6. Bright, smooth but very hazy conditions with zero cloud.
29th	Sortie 13 flown. 4 runs over areas 24 and 28. Bright sunshine zero cloud generally with some haze over 28.
30th	Sorties 14,15,16 and 17 flown with landings at Dundee and Edinburgh airports. 19 runs over areas CR3, and 23. Generally dull with slight haze, becoming very turbulent, 3/8th cloud at 4000 feet.
October 1st	Sorties 18 and 19 flown with landings at Edinburgh and Teeside after a night stop Dundee. 10 runs over areas 11 and 13. Generally dull conditions with slight haze and 3/8 cloud at 4000 feet.

Giving a total on site days for Phase III acquisition of 16 days

The weather conditions experienced during the 3 periods of the 1985 campaign were probably the worst since N.E.R.C. commenced their compaigns in 1982. Delayed starts, days completely washed out coupled to weather deteriation after promising starts made Phase II a most disappointing spell. The "standby day" arrangement enabled some areas otherwise lost during the contractual period, to be flown. In all 11.5 days of attempted acquisition have been recorded with 13 days of standby.

4. EQUIPMENT

4.1 Survey Camera

The camera used for this years N.E.R.C. campaign was a Wild RC8 wide angle survey camera using a 15 uag 396 lens and Kodak XX black/white film. This unit was manually operated throughout the survey period by the survey navigator who adjusted the forward overlap to suit the area being flown. The camera was installed in the existing forward camera hole of the N.E.R.C.

aircraft and produced throughout 9X9 format black/white images. The unit had a 6 inch focal length.

The film processing of selected runs was carried out in the photo laboratories of Hunting Survey Ltd, Borehamwood, who over the full season of flying produced a total of 1,404 prints. 540 prints Phase I 271 prints Phase II. 593 prints Phase III. The scale of these prints varied with the differing flying heights of each area. The scale of individual areas together with their "given" names are noted on the photo title strips. Photo cover was not flown over every ATM area and not all the acquired negatives were commissioned for prints. A copy of the photo flight logs and index maps of lines flown has been supplied with the survey prints.

4.2 The Airborne Thematic Mapper

The equipment chosen for the 1985 N.E.R.C contract was again the Daedalus Enterprises Inc. AADS 1268 ATM 11 channel scanner.

This complete sensor unit comprises: A scan head, a spectrometer and a digitiser, coupled in, on this survey, to a AADS 1840 HDDT to b/w film conversion unit, an HDDT playback unit and a Sangamo Sabre 80 III tape recorder, model 3630 1" machine. This combination of units enabled onsite production of HDDTs and 5" wide b/w quick-look prints of any one selected channel of data at aircraft base. Scan speeds were selected to suit the areas being flown and were selected from speeds 12.5, 25 and 50 scan/second available on the equipment as a standard. The S bend correction, another equipment standard, was selected and automatically applied over all areas flown. The standard operating wavelengths and performance parameters for the AADS 1268 ATM scanner are as follows:

TABLE 3

PRIMARY CHANNEL	CHANNEL BAND EDGES IN μM	12.5 SCANS/SEC NER 1	25 SCANS/SEC NER 1	50 SCANS/SEC NER 1
1	0.42 - 0.45	0.28	0.36	0.52
2	*0.45 - 0.52	0.06	0.07	0.10
3	*0.52 - 0.60	0.05	0.05	0.05
4	0.605- 0.625	0.10	0.10	0.11
5	*0.63 - 0.69	0.05	0.05	0.05
6	0.695- 0.75	0.05	0.05	0.05
7	*0.76 - 0.90	0.03	0.03	0.03
8	0.91 - 1.05	0.01	0.11	0.15
9	*1.55 - 1.75	0.07	0.10	0.17
10	*2.08 - 2.35	0.005	0.006	0.009
11	*8.5 -14.0	0.05°	0.07°	0.08°

* Thematic Mapper bands (except thermal band) broadened for aircraft operations.

i. Noise equivalent radiance in $Wx10^{-7}$ cm-2 nm-1 sr-1.

ii Instantaneous field of view (IFOV) 2.5 MRAD (with 1.25 MRAD option).

iii Digitised field of view 85.92 deg. (2.5 mr IFOV)
It should be noted that this field of view reduces to 72 degrees when the S bend correction is applied, as throughout this survey.

iv Velocity/height ratio (based on 2.5 mr IFOV)

0.031 radians/sec	-	12.5 scan/sec
0.062 "	"	25.0 " "
0.125 "	"	50.0 " "

v Roll correction +/- 15 degrees

vi Infrared reference source
2 controllable thermal black bodies with a temperature range of -15 deg. to + 50 degrees C with respect to scan head heat sink temperatures.

Figure 1 outlines in diagrammatic form the functional operations of both scanner head and the spectometer.

4.3 Radio Communication Units

8. SMC 317L6 3 watt 6 channel 2-way units were supplied to N.E.R.C. to assist in air/ground movements during over flights of selected areas. The radios were tuned to the Hunting licenced frequency of 169.275 Mhz. This licence having previously been allocated to the Hunting Group by the Home Office.

5. DATA ACQUIRED AND PRESENTED

5.1 On site

a. 19 HDDTs (High Density Data Tapes) and one channel of b/w prints of "quick look" imagery were produced progressively throughout the three survey periods. The HDDT useage was carried forward sortie to sortie until total capacity had been achieved. There was no carry forward of HDDTs from one period to the next e.g Spring to Summer.

b. 9 x 9 photo cover was taken on all lines flown except area 23 (Tay estuary) when 12 ATM lines without camera were flown. In total 1404 b/w prints plus 302 dupe film positives were produced from the N.E.R.C selected areas throughout the 3 periods. Period by period this amounted to: Period I Spring 593 prints. Period II

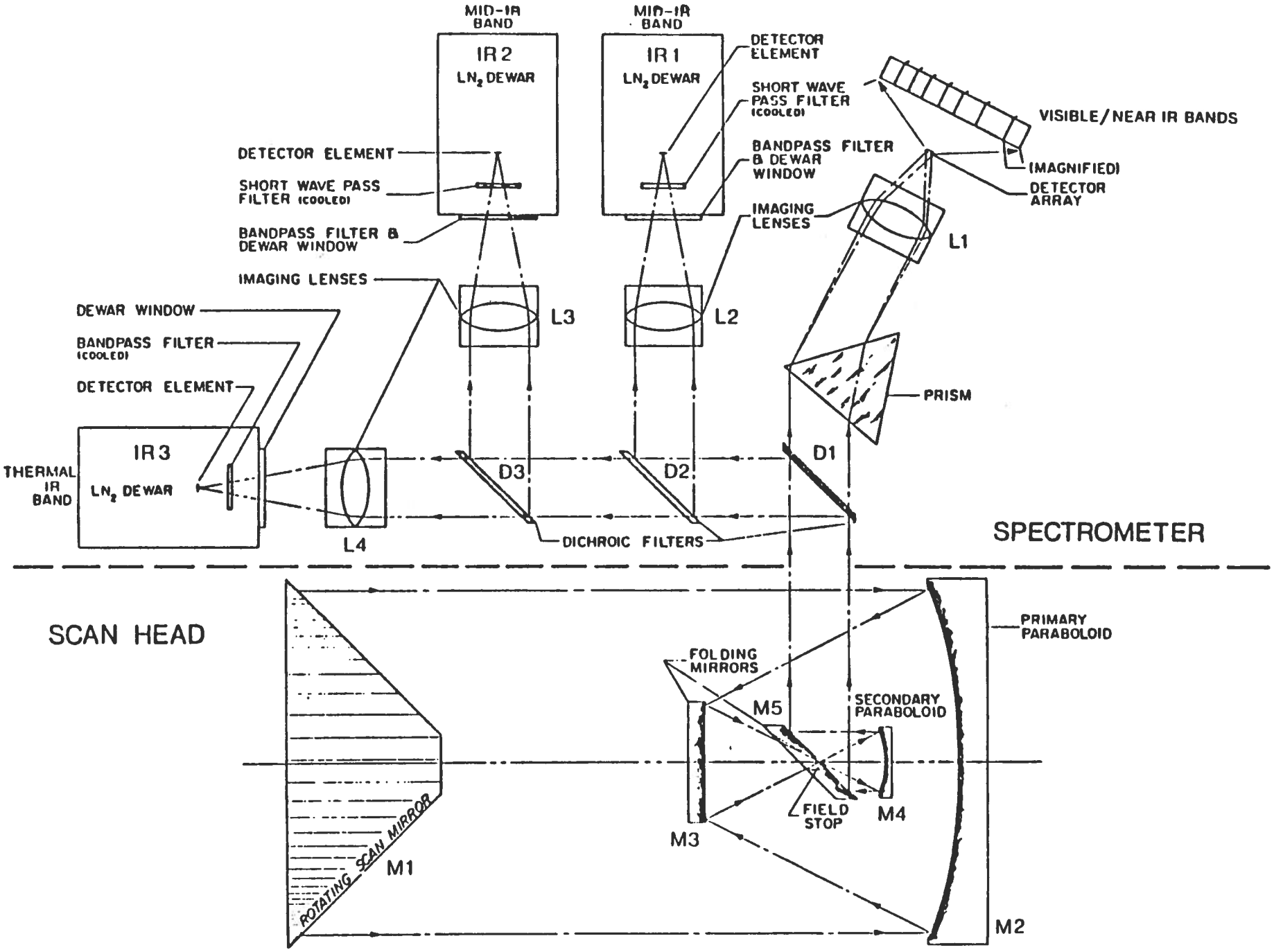


FIGURE 1

AADS1268 DIGITAL MSS SYSTEM – SCAN HEAD/SPECTROMETER – OPTICAL DIAGRAM

Summer 271 prints plus 225 dupe film positives Period III Autumn 540 prints plus 77 dupe film positives. The dupe film positives were only produced for area 15 the Irish Sea.

5.2 Final presentations

a. The field produced HDDTs were converted to CCTs in the Hunting laboratories at Elstree on their HP.3000 computer where all channels of data per line flown were recompiled with start and scans correlated. No flight line was split onto a second tape. The data is presented on the CCTs in the Hunting's band interleaved raw data format (see description in Table 4)

b. Parts of entire areas of photo cover taken during the ATM flying were selected by N.E.R.C. or their representative F.J.Cook and presented as either 9x9 B/W prints or dupe film positives in frame form. An index plot of all lines flown with photo cover, showing print and run number on 1:50,000 scale ordnance survey map sheets have also been presented.

c. A report of operations in 5 copies.

5.3 CCT Format

TABLE 4

HUNTINGS BAND INTERLEAVED ATM RAW DATA TAPE FORMAT

As revision 1.1 of April 1985

1. Daedalus AADS 1268

The Daedalus AADS 1268 is an 11-channel digital airborne scanner recording in the 0.42 to 14.00 μm region of the electromagnetic spectrum.

The wavelengths of each of the 11-channels are shown in Table 3.

The scanner also records a 12th channel which has the same wavelength as channel 11 but with a gain setting of a half of that of channel 11. This channel can be of particular use when data in channel 11 is saturated.

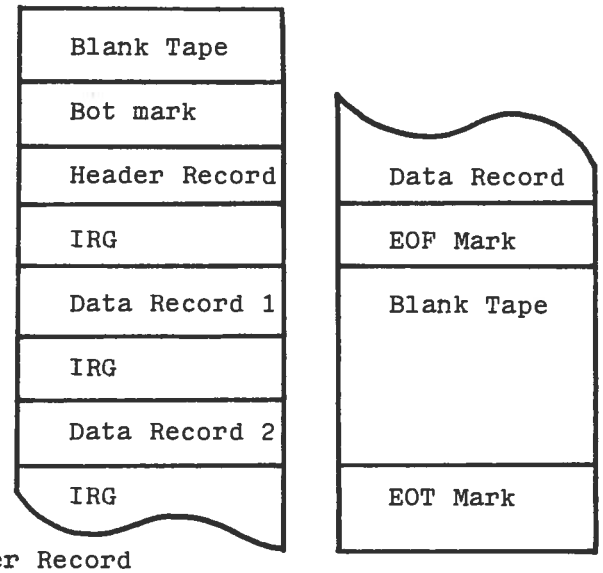
2. Tape Format

Data is recorded on a computer industry standard 0.5 inch nine track magnetic tape with a packing density of 1600 bits per inch (bpi).

3. Recorded Data Format

The data is recorded on the tape in standard band interleaved by line (BIL) format.

The following paragraphs describe how the data is physically organised on the tape.



3.1 Header Record

This record is 576 bytes long and contains ASC11 informative data. This record is split into 22 sub-records as described in Table A. Each sub-record is terminated with a carriage return and linefeed.

T A B L E A

Line No.	Length (bytes)	Bytes Nos.	Contents
1	40	1-40	Hunting Geology and Geophysics AADS 1268
2	52	41-92	Clients name
3	13	93-105	Tape nnn
4	23	106-128	Flight Date dd-mmm-yy
5	12	129-140	Flight nn
6	34	141-174	Bands n.m.o.p.....
7	39	175-213	Site - erehwon
8	35	214-248	Scan/Frame Count - Start nnnnnn
9	36	249-284	Scan/Frame Count - Finish mmmmmm
10	30	285-314	Ground Clearance nnnn metres
11	25	315-339	Ground Speed nnnn Knots
12	22	340-361	Pixel nn metres wide
13	22	362-383	Pixel mm metres long
14	17	384-400	750 Frame Bytes
15	25	401-425	Record Size nnnnn Bytes
16	24	426-449	Band Frame Interleaved
17	21	450-470	Video Start Byte 24

18	20	471-490	Video End Byte 739
19	13	491-503	BB1 Byte 23
20	14	504-517	BB2 Byte 740
21	29	518-546	n.nn Milliradian Resolution
22	30	547-576	Source HDDT nnn

3.2 Tape Data Record

These records will be of constant size within tape files. That size will depend on the number of channels of data contained in the file.

Table B itemises all the possible data record sizes.

T A B L E B

No.Bands	Block Size(bytes)
1	7500
2	7500
3	9000
4	9000
5	7500
6	9000
7	10500
8	6000
9	6750
10	7500
11	8250
12	9000

The layout of these bytes is shown in Table C.

T A B L E C

Byte No.	Content
1-750	Scan line 1 Channel 1
751-1500	Scan line 1 Channel 2
1501-2250	Scan line 1 Channel 3
etc.	etc.

3.3 Logical Data Record

Logical data records are of a constant size of 750 bytes. They contain the data for one scan line for one channel.

The contents of these 750 bytes are shown in Table D.

T A B L E D

Byte No.	Recording Type	Description
1-4	binary	Start of frame code
5	binary BCD	Run number (4 msb) Extended line count (4 lsb)
6-8	BCD	Line count
9-12	BCD	Thumbwheel setting
13-14	BCD	Calibration source 1
15-16	BCD	Calibration source 2
17-21	binary	External digital data
22	binary	Gain, S bend and channel number
23	binary	Digitised BB1
24-739	binary	Video data
740	binary	Digitised BB2
741-750	binary	End of frame code

3.3.1 Start of Frame Code

This is a 4 byte binary pattern used to synchronise the scan. The contents of the 4 bytes are shown in Table E.

T A B L E E

Byte No.	Contents
1	01010110
2	10100101
3	10100110
4	10101111

3.3.2 Run Number/Extended Line Count

This is a single byte. The 4 most significant bits contain the sortie number in binary. The 4 least significant bits contain the millions digit of the scan line number recorded in binary coded decimal.

3.3.3 Line Count

This is a 3 byte representation of the scan line number which is recorded in binary coded decimal.

3.3.4 Thumbwheel Setting

This is a 4 byte representation of the contents of the thumbwheel of the scanner itself. It is recorded in binary coded decimal.

3.3.5 Calibration Source

These two pairs of bytes contain the temperatures (degrees Celcius) of the scanners two black body references. They are recorded in binary coded decimal as shown in Table F.

T A B L E F

Bit No.	Content
15	Sign bit 0 = negative 1 = positive
14-12	Tens of degrees
11-8	Degrees
7-4	Tenths of degree
0-3	Hundreths of degree

3.3.6 External Digital Data

These 5 bytes contain certain operational parameters for the scanner. The only parameter of any relevance is contained in the two most signficant bits of byte 17. These contain the speed at which the scanner is working. See Table G for options.

T A B L E G

Contents of 2 msb byte 17	Meaning
00	12.5 scans/sec
01	25 scans/sec
10	50 scans/sec

3.3.7 Gain, S Bend, Channel Number

These are all contained in a single byte.

The gain and S bend are encoded in the four most significant bits of the byte as shown in Table H.

The channel number is encoded in the four least significant bits of the byte as shown in Table J.

T A B L E H

Contents of 4 msb	Gain Setting	S Bend Setting
0101	8	Out
0100	4	Out
0011	2	Out
0010	1	Out
0001	0.5	Out
1101	8	In
1100	4	In
1011	2	In
1010	1	In
1001	0.5	In

T A B L E J

Contents of 4 lsb	Channel No.
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	10
1011	11
1100	12

3.3.8 Digitised BB1

This is a single byte which contains the binary representation of the intensity recorded when the scanner was viewing black body reference 1.

This is recorded as if the scanner was set with a gain of 1 for channel 11.

3.3.9 Video Data

These are contained in 716 consecutive bytes and contain the data for 716 pixels across the scan line.

3.3.10 Digitised BB2

This is a single byte which contains the binary representation of the intensity recorded when the scanner was viewing black body reference 2.

This is recorded as if the scanner was set with a gain of 1 for channel 11.

3.3.11 End of Frame Code

These are contained in ten consecutive bytes which contain a binary in pattern used to synchronise the scan. The contents of each of the 10 bytes is 10101010.

4. Common Conventions

4.1 Byte Numbering

The data is packed two bytes per 16 bit computer word. These are numbered in the standard Hewlett-Packard form such that the most significant byte is numbered 1 and the least significant 2.

This standard is different from that used by Digital and other computer manufacturers who number them the other way round.

4.2 Bit Numbering

The bits within a 16 bit computer word are numbered 0 to 15 with 0 being the least significant bit.

5. Conclusions

5.1 Input to Image Processing Systems

This data is blocked to gain maximum data content on to CCT which means that it is not readily input to an image processing system.

Input is usually achieved by special software or by deblocking the data.

5.2 Non Hewlett Packard Computers

If this data is to be read on to a non Hewlett Packard computer it may be necessary to swap the bytes within each 16 bit word.

If this is not done the resulting image will look grainy. This shows itself up on straight line features which go diagonally across the image. They will look very steppy.

5.4

TABLE 5

EXAMPLE OF TAPE RELATED INPUT DATA

TAPE 1 or 2 or 3 etc.

Site - New Forest 13

N.E.R.C.

Flight Date 26-May-85

Bands 1-2-3-4-5-6-7-8-9-10-11-12

Scan/Frame Count - Start 23000 Scan/Frame Count - Finish 26999

Scan Speed = 12.5 Scans Per Second

Low Blackbody = 17 Low Temp Ref = 14.78 Degrees Celcius

High Blackbody = 252 High Temp Ref = 44.71 Degrees Celcius

Gains=4.0 2.0 2.0 4.0 2.0 4.0 2.0 4.0 2.0 2.0 1.0 0.0

6. MATERIALS SUPPLIED TO CLIENT

6.1 Survey Film

A total of 1404 9"x9" black/white survey photographs plus 302 dupe film positives of varying scales and all negative film produced over the clients selected areas have been supplied to Swindon.

6.2 "Quick Look" Imagery

Uncorrected 5" wide b/w prints of one channel of data along all lines flown were produced with the field equipment and presented to the client for inspection.

6.3 CCTs

An overall total of 264 master CCTs covering all selected areas flown have been supplied, plus a duplicate set as contractually required.

6.4 HDDTs

The field produced HDDTs covering all areas flown are held by Huntings pending a directive as to their disposal within the next 12 months. Total held for 1985 campaign 18.

6.5 Flight Maps

A full set of 1:50,000 scale ordnance survey map sheets covering each area flown, with recovered flight tracks plotted from 9"x9" survey prints superimposed, have been supplied with each periods flying. Duplicate maps have been supplied if area flown again in seperate periods.

6.6 Operations Report

An operations report covering the full 1985 campaign and complete with data tape formats in 5 copies has been presented.

P A R T 2

FIGURES

FIGURE 2

AREA NO. 2

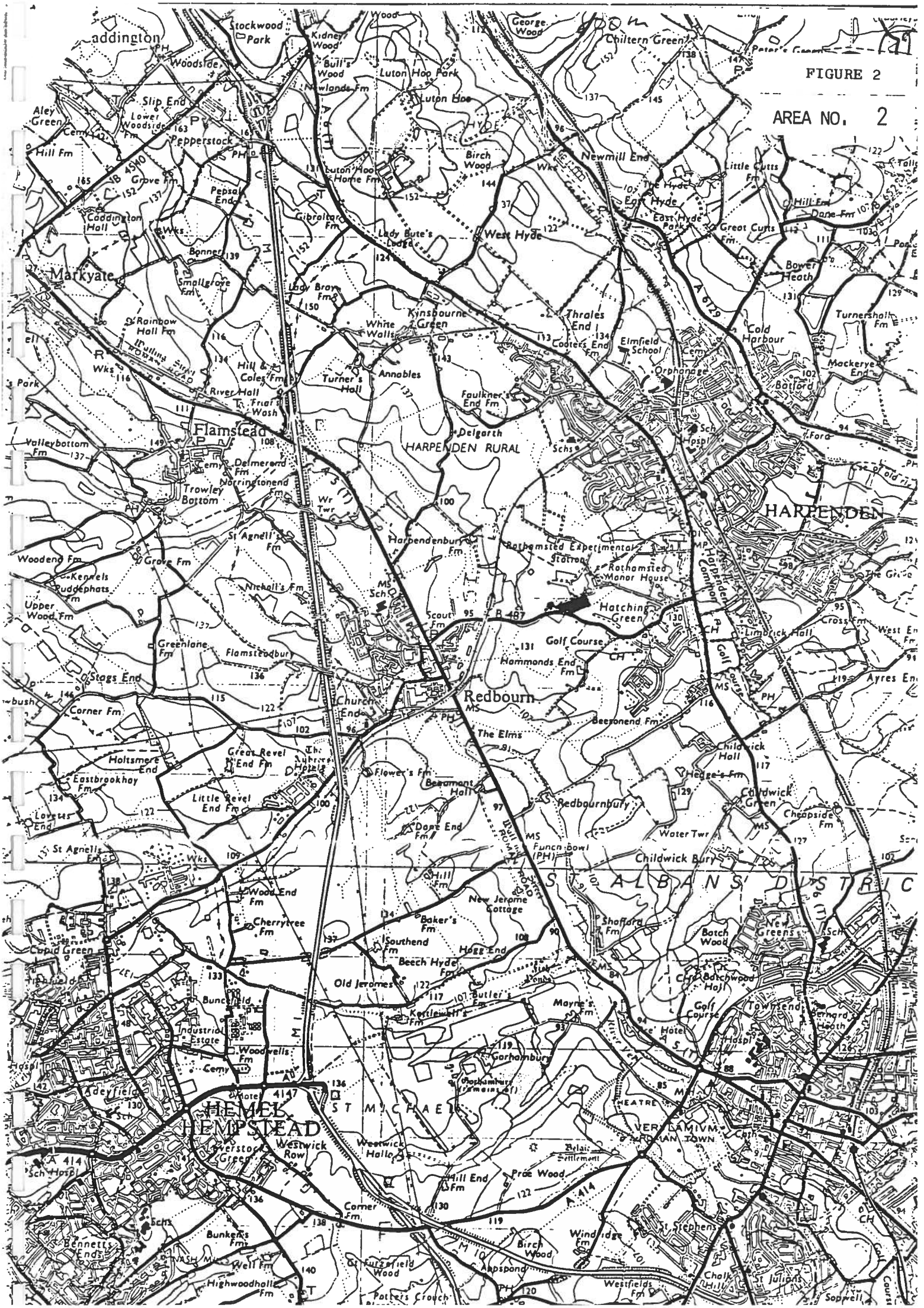
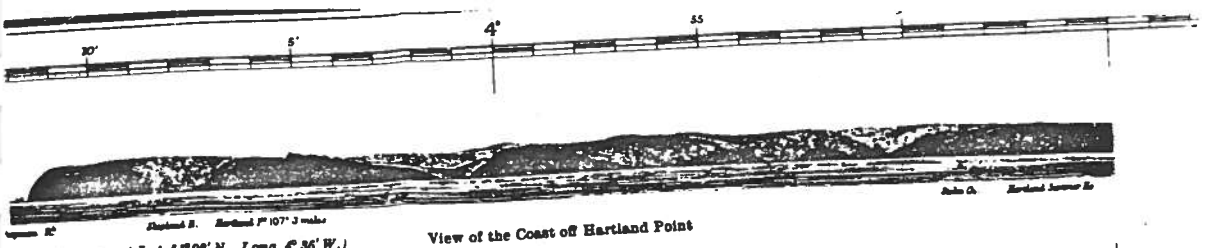



FIGURE 3
AREA No. 3
LOCH LEVEN
KINROSS
Milnathort
Scotlandwell
PORTMOAK (det)
Lochore
A 911
A 91
M 90
B 996
B 919
B 9097
B 920
Castle Island
St Serf's Island
Reed Bower
Alice's Bower
Roy's Folly
Green Craigs
Kinnesswood
Glenlomond Hospital
Burleigh Golf Course
Standing Stones
Tillywhilly
Upper Tillyrie
Middleton
Blairnathort
Arlary
Tochill
Lathro
Lethangie
Moore of Kinross
Home Fm
Brunthill
Goudiehannet
Chanceinn
Cavelstone
Rushfield
Gairney Bank
Classlochie
Hatchbank
Gairneybank Fm
Ard Gairney
Gairney Water
Dowhill
Sandpeddie
Lochran
Parenwell
Dichindad
Gordon Wood
Kinnaird
Blair Mill
Portmoak
Portmoak Moss
Wellburn
Red House
Airfield
Lochend
Levenmouth Plantn
Levenmouth
New Gullet Bridge
Balbedie
Findatlie
Waterbutts Plantn
East Brackley
West Brackley
Gairneybridge
Blackcraigs
Annaeraich
Cakegour
Fruix Fm
Dunmore
Middlebarn
Kirkland Fm
Pabledrae
South Bogside
North Pitkinny
Milton
Burnside
Lappie
Lappiemoss
Easter Gospetry
Wester Gospetry
Butterwell
Muirs of Kinnesswood
Glenvale
Kinnesswood Moor Plantation
Harperleas
Newlands
Lomondville
Pitcadrich
Ilkston
Balgedie
Easter Balgedie
Old Quarry
Prinnels
Bishop Hill
Grahamstone
Kilmagadwood
Inn
Balmelarth
Tillywhilly
Burn
Green Burn
Channel
Dorrley Cott
Orwell
Lotmies
Blairfield
Southfield
Burnhead
Collistan
Drumoe
Bannaty
Bonnyton Mill
Nether Urquhart
Lacesston
Cathill Towers
Lowmuir Plantn
Tannochill
Holton
Hall
Hiltonburn
Netherton
Mawcarse
Bertonburn
Tillywhilly
Hilton
Lathro
Cemy
Golf Ese
CH
Pier
Jetty
Cemy
Balleave
Ilybank
Mowthorn Vale
Gairney Bank
Hatchbank
Gairneybank Fm
Annaeraich
Cakegour
Ard Gairney
Gairney Water
Fruix Fm
Dowhill
Sandpeddie
Lochran
Parenwell
Dichindad
Gordon Wood
Kinnaird
Blair Mill
Milton
Lochore
Balbedie
Findatlie
Levenmouth
Levenmouth Plantn
Airfield
Lochend
Red House
Portmoak
Portmoak Moss
Wellburn
Scotlandwell
Kinnesswood
Green Craigs
Grahamstone
Kilmagadwood
Inn
Balmelarth
Prinnels
Bishop Hill
Old Quarry
Easter Balgedie
Ilkston
Pitcadrich
Lomondville
Newlands
Glenlomond Hospital
Glenvale
Kinnesswood Moor Plantation
Harperleas
Muirs of Kinnesswood
Wester Gospetry
Easter Gospetry
Butterwell
Burnside
Lappie
Lappiemoss
Lacesston
Bonnyton Mill
Nether Urquhart
Bannaty
Drumoe
Collistan
Burnhead
Blairfield
Southfield
Cathill Towers
Lowmuir Plantn
Tannochill
Holton
Hall
Middleton
Blairnathort
Arlary
Netherton
Mawcarse
Bertonburn
Tillywhilly
Upper Tillyrie
Hiltonburn
Tillywhilly
Burn
Green Burn
Channel
Dorrley Cott
Orwell
Lotmies
Standing Stones
Tochill
Lathro
Lethangie
Moore of Kinross
Golf Ese
Home Fm
CH
Cemy
Pier
Jetty
Kinross House
Cemy
Pier
Roy's Folly
Alice's Bower
Pier
Castle Island
Reed Bower
Scott Island
Balleave
Brunthill
Goudiehannet
Chanceinn
Cavelstone
Rushfield
Gairney Bank
Classlochie
Mowthorn Vale
Hatchbank
Gairneybank Fm
Annaeraich
Cakegour
Ard Gairney
Gairney Water
Fruix Fm
Gairneybridge
Blackcraigs
East Brackley
West Brackley
Waterbutts Plantn
Dowhill
Sandpeddie
East Lochran

FIGURE 4

AREA NO. 5



View A. (at Lat. 51°09' N., Long. 6° 36' W.)

View of the Coast off Hartland Point

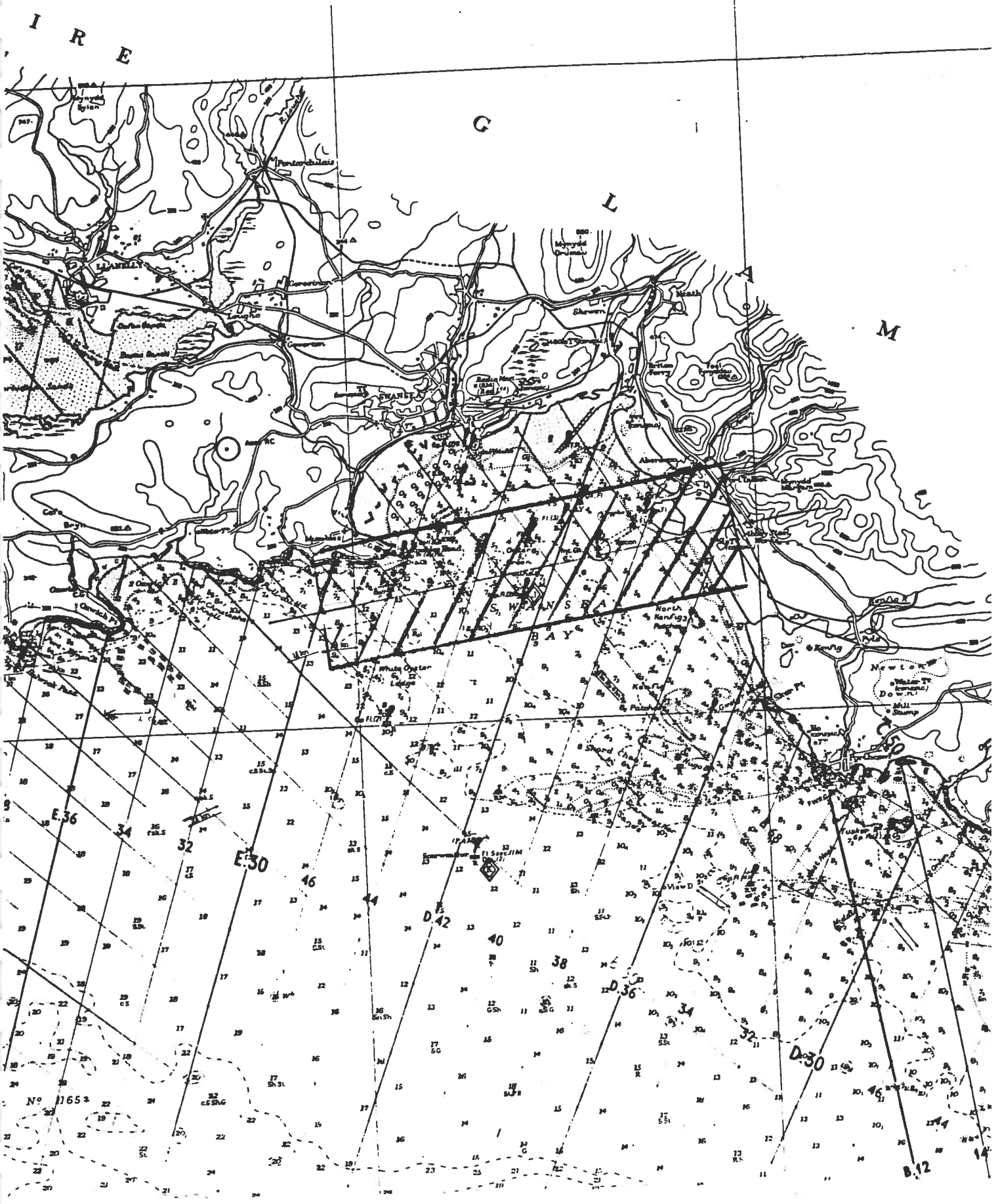


FIGURE 5

AREA NO. 5B

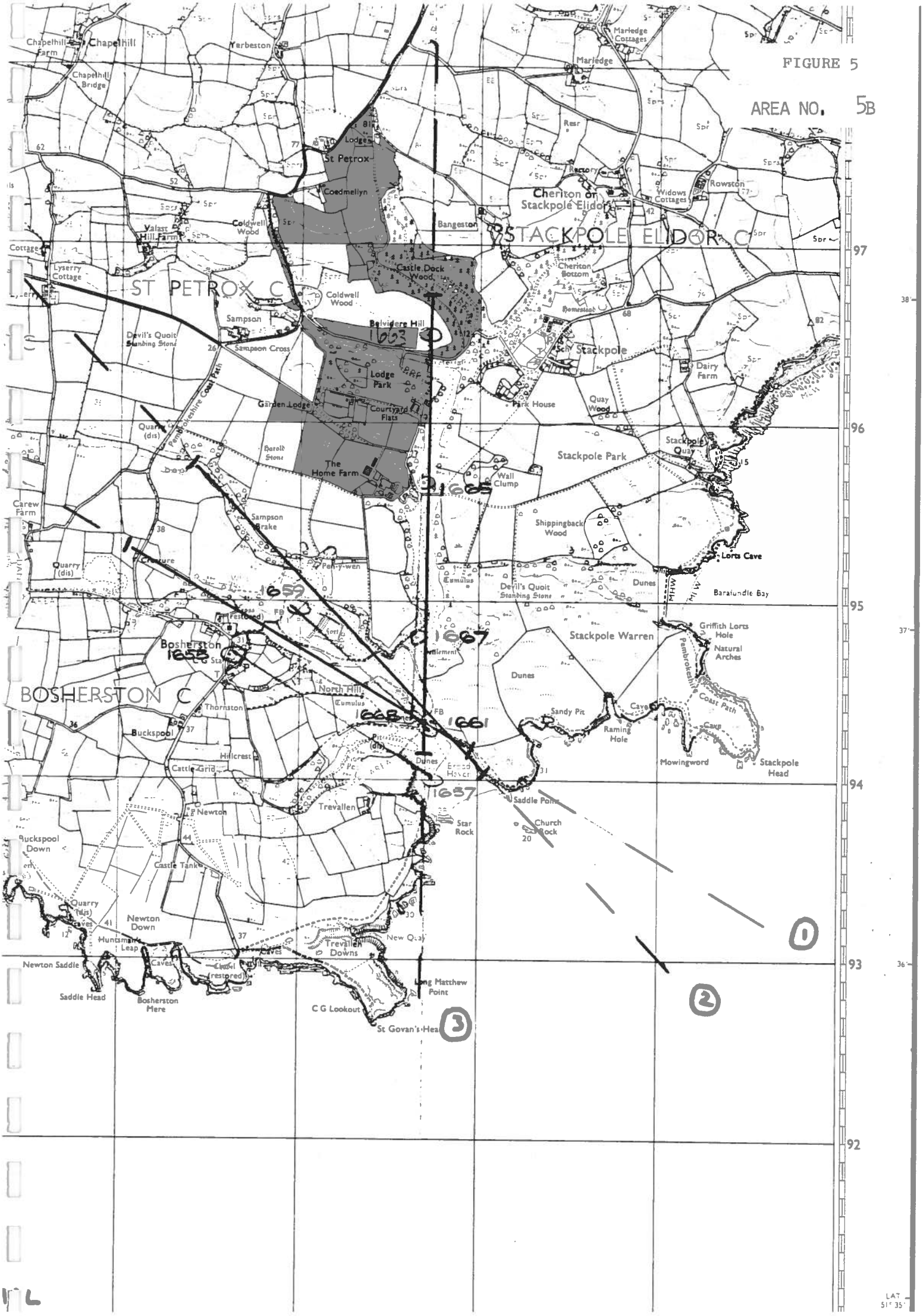
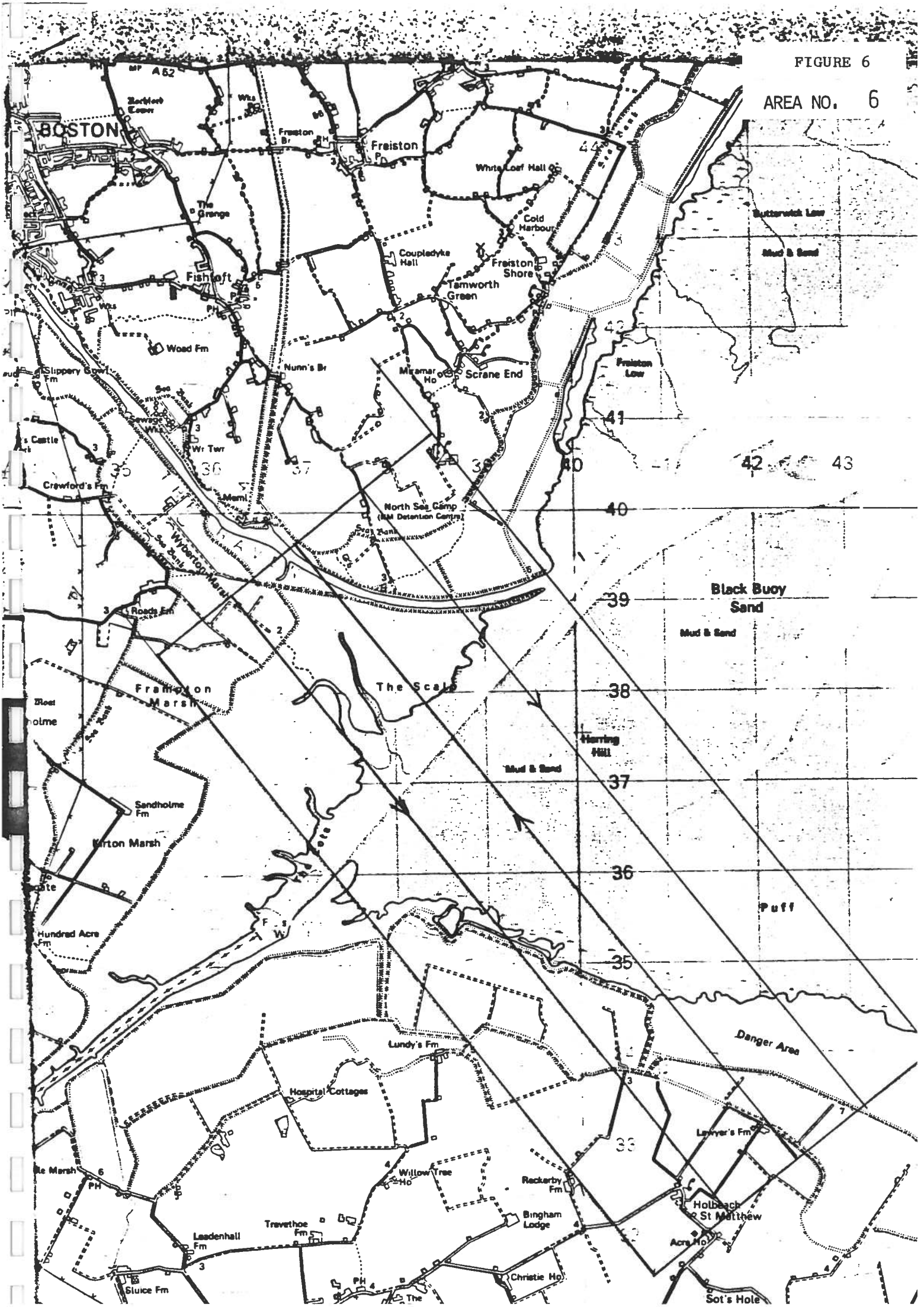


FIGURE 6

AREA NO. 6



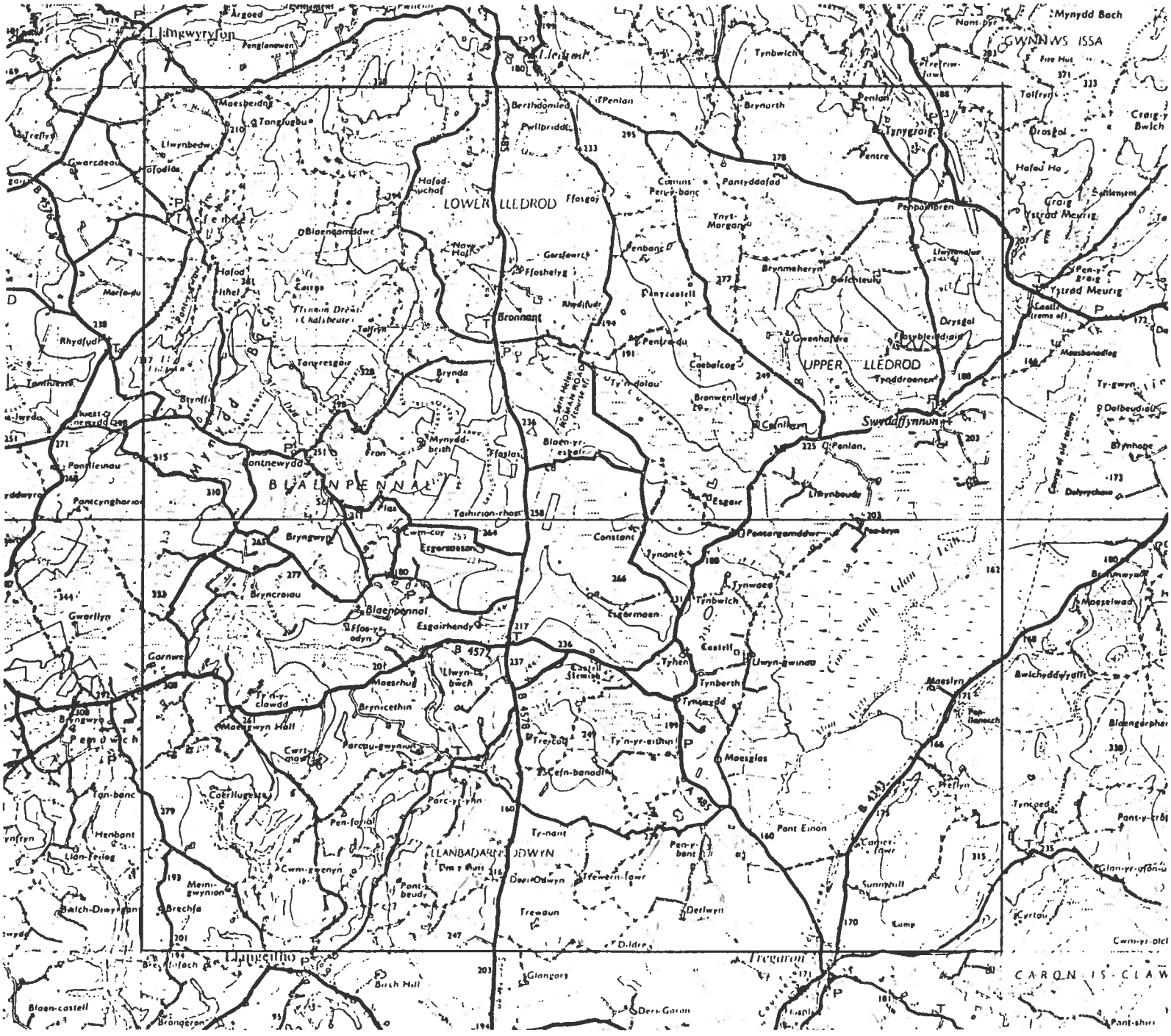


FIGURE 7

AREA NO. 10

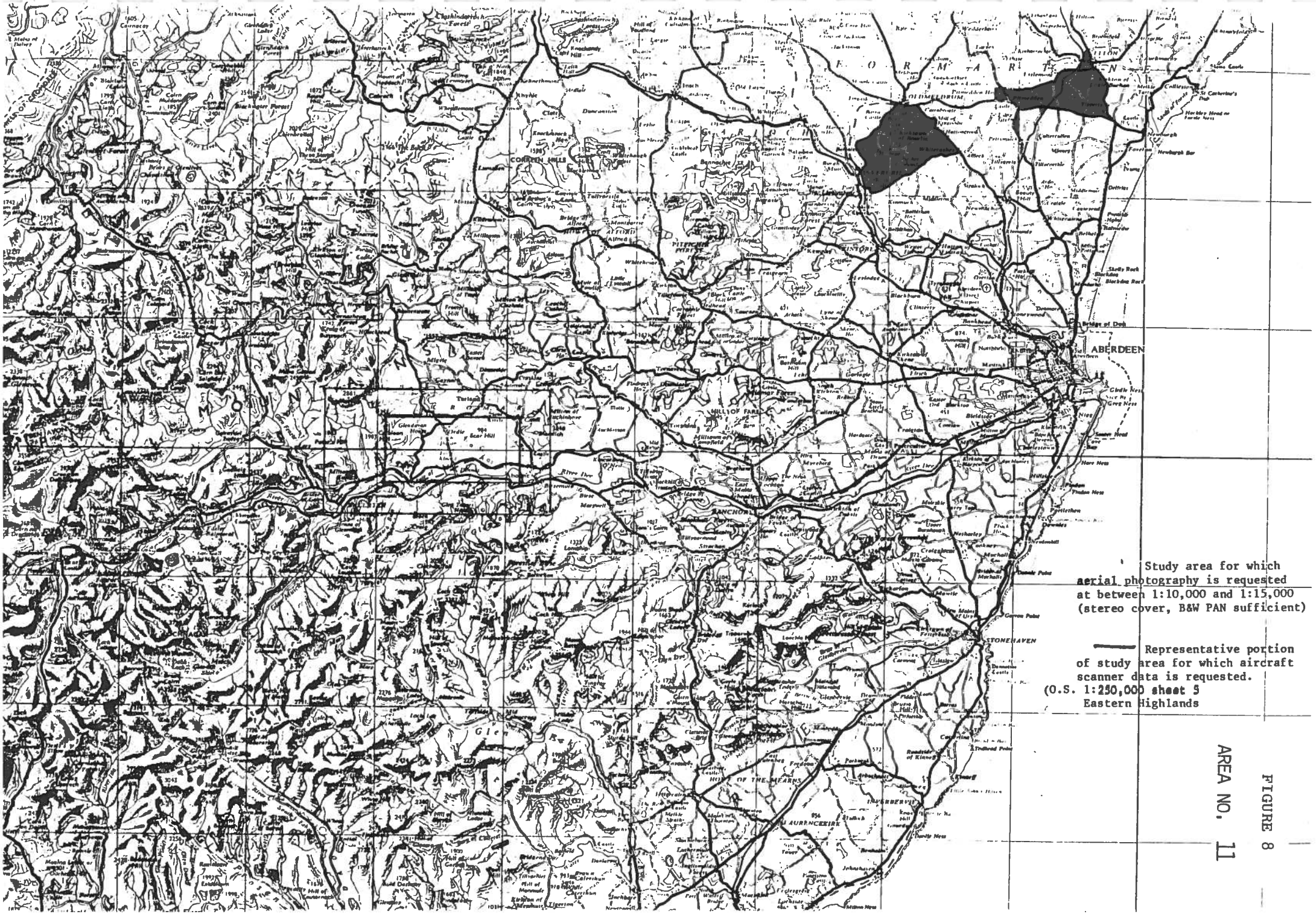


FIGURE 8

AREA NO. 11

FIGURE 9

AREA NO. 12

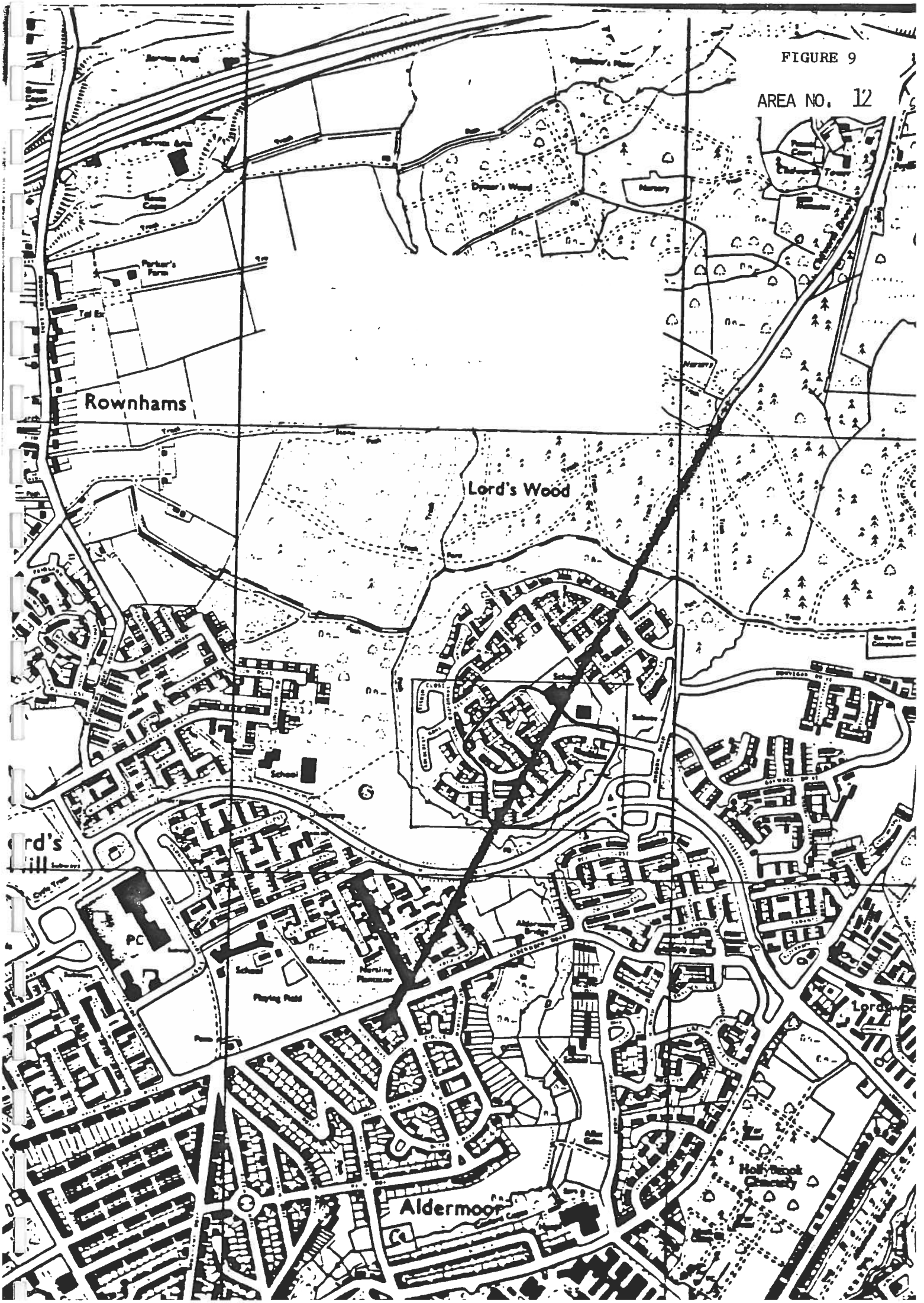
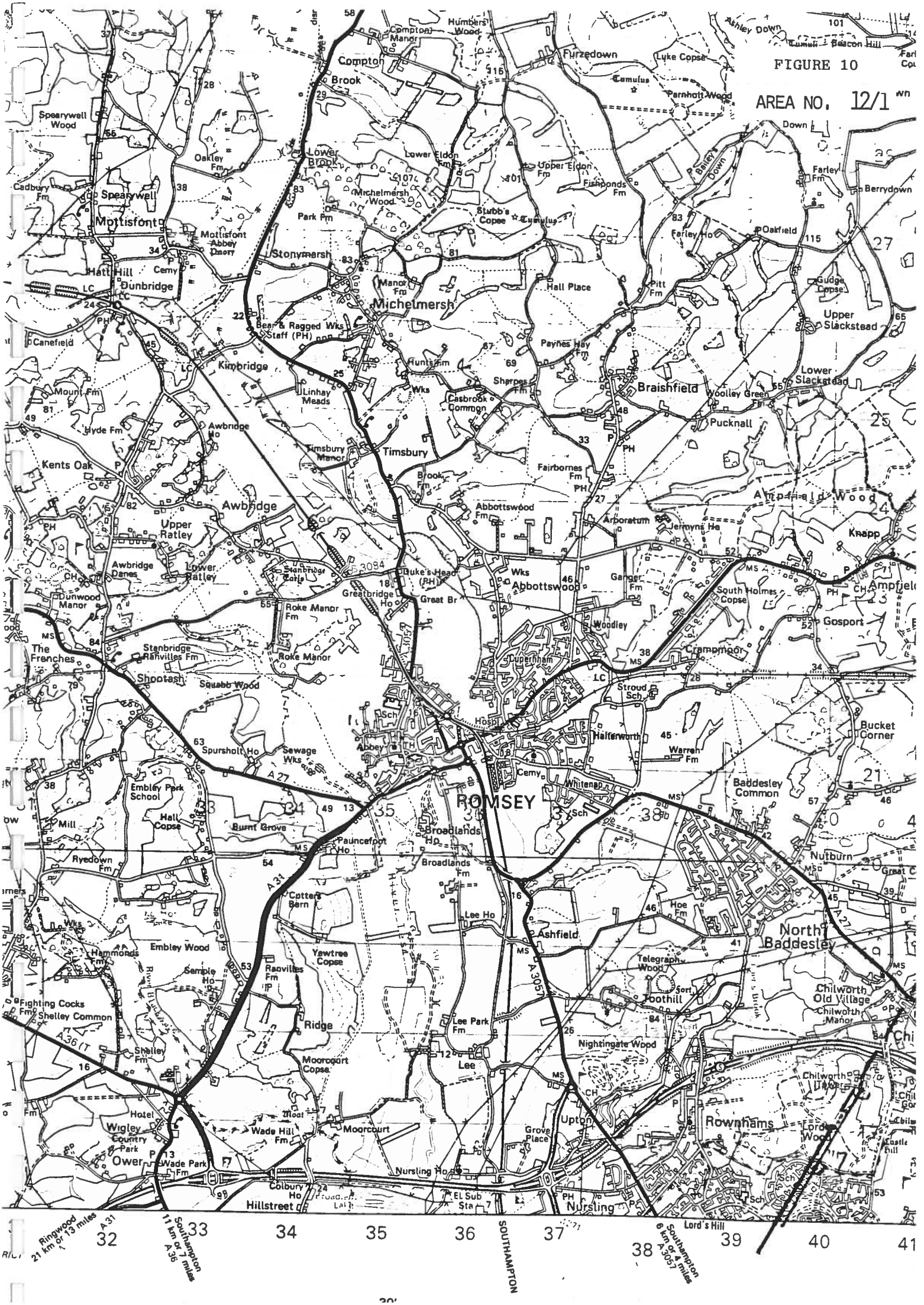


FIGURE 10

AREA NO. 12/1



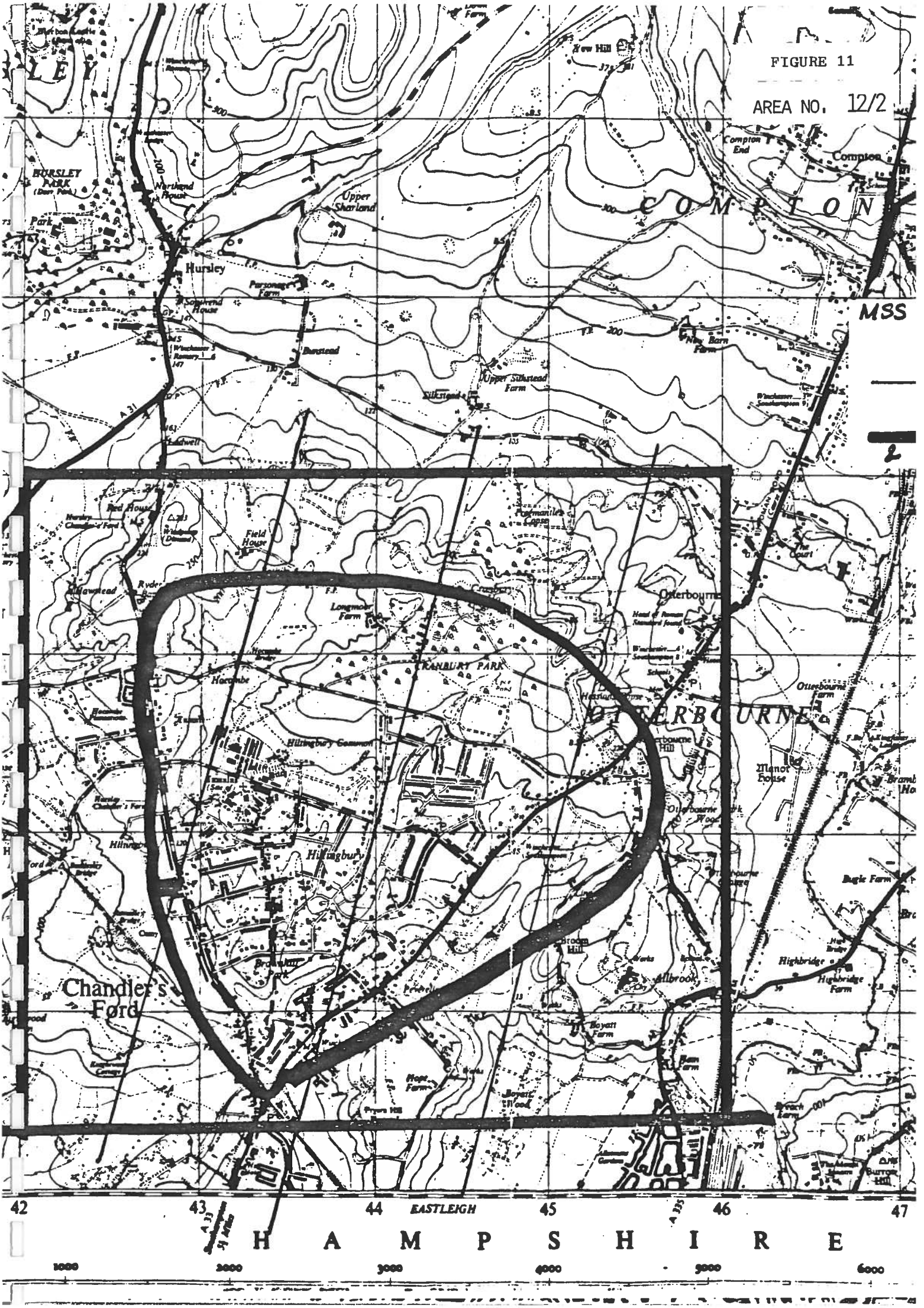


FIGURE 11
AREA NO. 12/2
MSS
COMPTON
Compton
Upper Sharland
Hursley
Park
Northend House
Personage Farm
Southend House
Burstead
Upper Silkstead Farm
Silkstead
New Barn Farm
Red House
Field House
Longmoor Farm
Hursley Chandler's Ford
Hillingbury Common
Hillingbury
Hiltingbury
Chandler's Ford
KANBURY PARK
Otterbourne
Otterbourne Farm
Manor House
Bugle Farm
Highbridge
Highbridge Farm
Hillbrook
Boyatt Farm
Pitt Farm
Hoe Farm
Boyatt Wood
Bytach Farm
Compton End
New Hill
42
43
44
EASTLEIGH
45
46
47
HAMPSHIRE
1000
2000
3000
4000
5000
6000

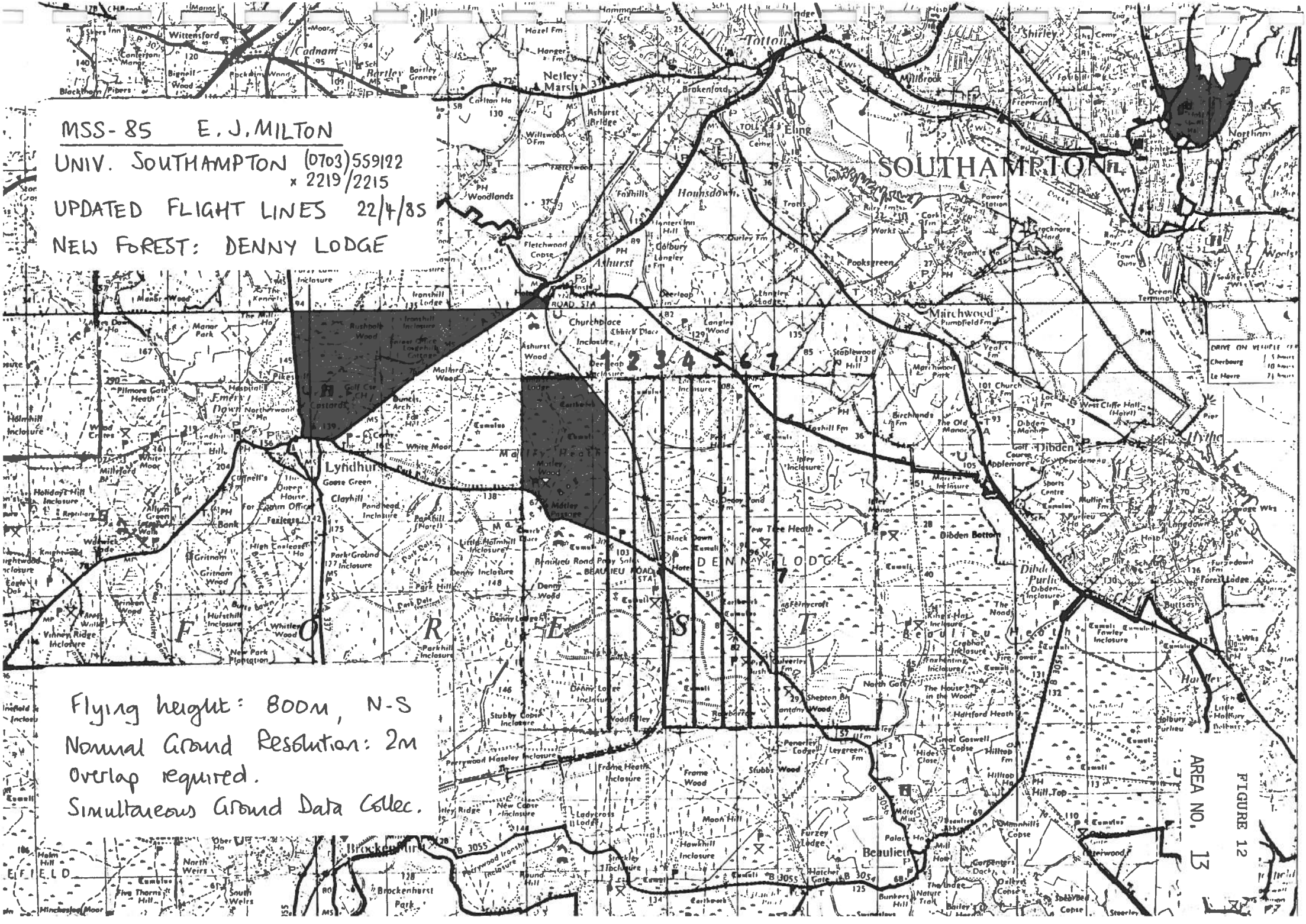

MSS-85 E.J.MILTON
UNIV. SOUTHAMPTON (0703) 559122
x 2219/2215
UPDATED FLIGHT LINES 22/4/85
NEW FOREST: DENNY LODGE
SOUTHAMPTON
Totton
Eling
Netley Marsh
Hounsdown
Ashurst
Lyndhurst
Dibden
Marchwood
Beaulieu
Brockenhurst
1 2 3 4 5 6 7
DENNY LODGE
FOREST
Flying height: 800M, N-S
Nominal Ground Resolution: 2M
Overlap required.
Simultaneous Ground Data Collec.
AREA NO. 13
FIGURE 12

FIGURE 13

AREA NO. 13B

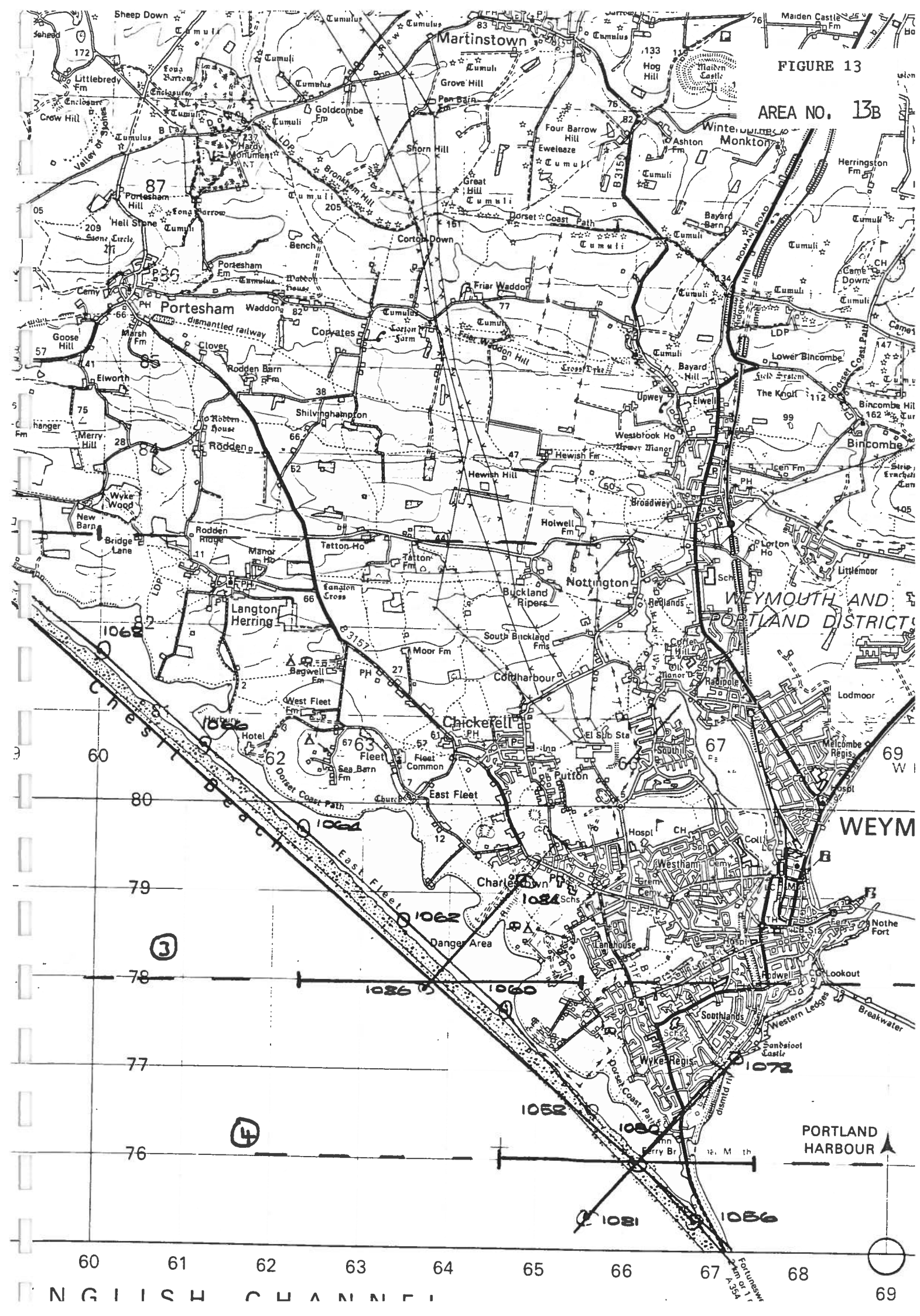


FIGURE 13/1

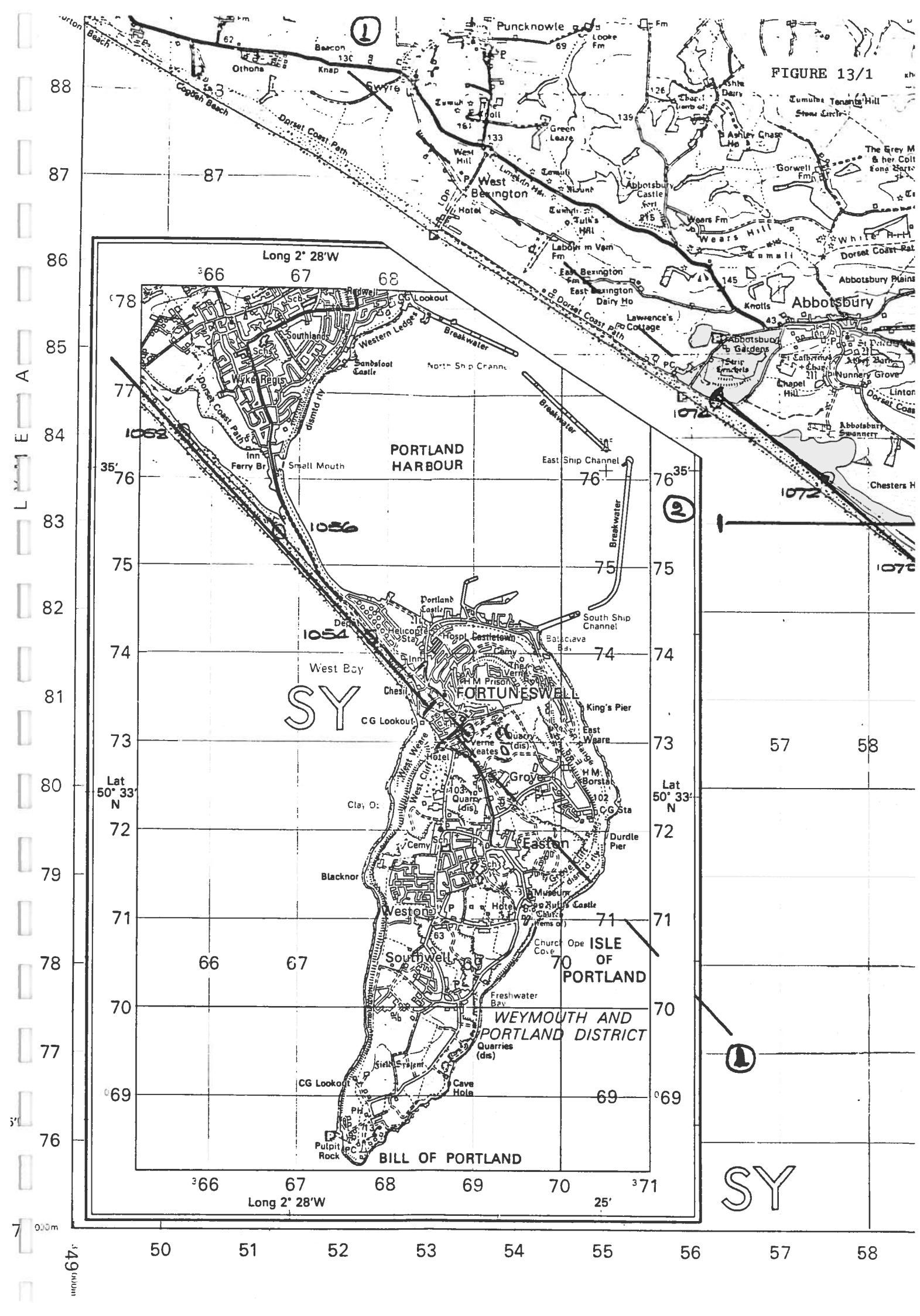

Long 2° 28'W
Lat 50° 33' N
PORTLAND HARBOUR
West Bay
FORTUNESWELL
Easton
Weston
Southwell
ISLE OF PORTLAND
BILL OF PORTLAND
WEYMOUTH AND PORTLAND DISTRICT
Portland Castle
Pulpit Rock
Cave Hole
Freshwater Bay
Church Ope Cove
Durdle Pier
King's Pier
East Weare
West Weare
Breakwater
East Ship Channel
South Ship Channel
Sandsfoot Castle
Wyke Regis
Small Mouth
Ferry Br
Chesil
CG Lookout
Hospl
Castletown
Balaclava Bay
HM Prison
Verne Yeates
Grove
Quarry (dis)
Blacknor
Museum
Rufus Castle
Church (remains of)
Hotel
Inn
Cemy
Sch
PH
PC
Quarries (dis)
Old Engine House
Puncknowle
Othona
Bincombe
Knap
Swyre
Coppish Beach
Dorset Coast Path
West Bexington
Hotel
Tumuli
Green Leaze
Abbotsbury
Abbotsbury Castle
Wears Hill
Gorwell Fm
Knotts
Abbotsbury Gardens
Chapel Hill
Nunnery Grove
Abbotsbury Plains
Dorset Coast Path
Lawrence's Cottage
East Bexington Fm
East Bexington Dairy Ho
Labour in Vain Fm
Tulls Hill
Langdon Hill
Ashley Chase Ho
Tumulus
Tenants Hill
Stone Circle
Looke Fm
Redwell
Southlands
Western Ledges
Breakwater
dismtd rly
Portland Helicopter Stn
Verne Common
Clay Q
Cemy
Sch
Long 2° 28'W
Lat 50° 33' N
25'
35'
1052
1054
1056
1072
1074
1076
1078
1080
1082
1084
1086
1088
1090
1092
1094
1096
1098
1100
1102
1103
1104
1106
1108
1110
1112
1114
1116
1118
1120
1122
1124
1126
1128
1130
1132
1134
1136
1138
1140
1142
1144
1146
1148
1150
1152
1154
1156
1158
1160
1162
1164
1166
1168
1170
1172
1174
1176
1178
1180
1182

FIGURE 14

AREA NO. 15

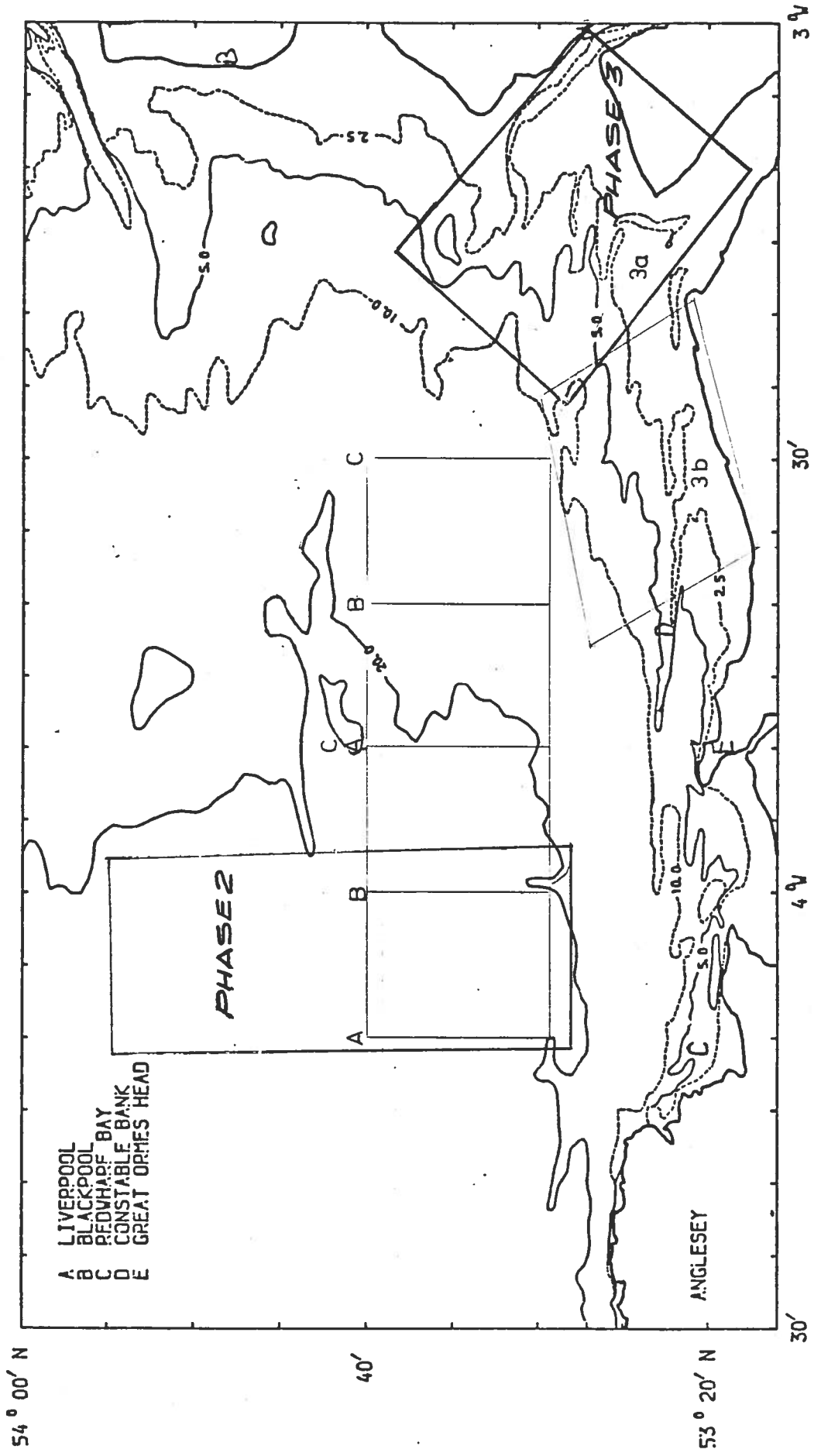


FIGURE 15

AREA NO. 15II

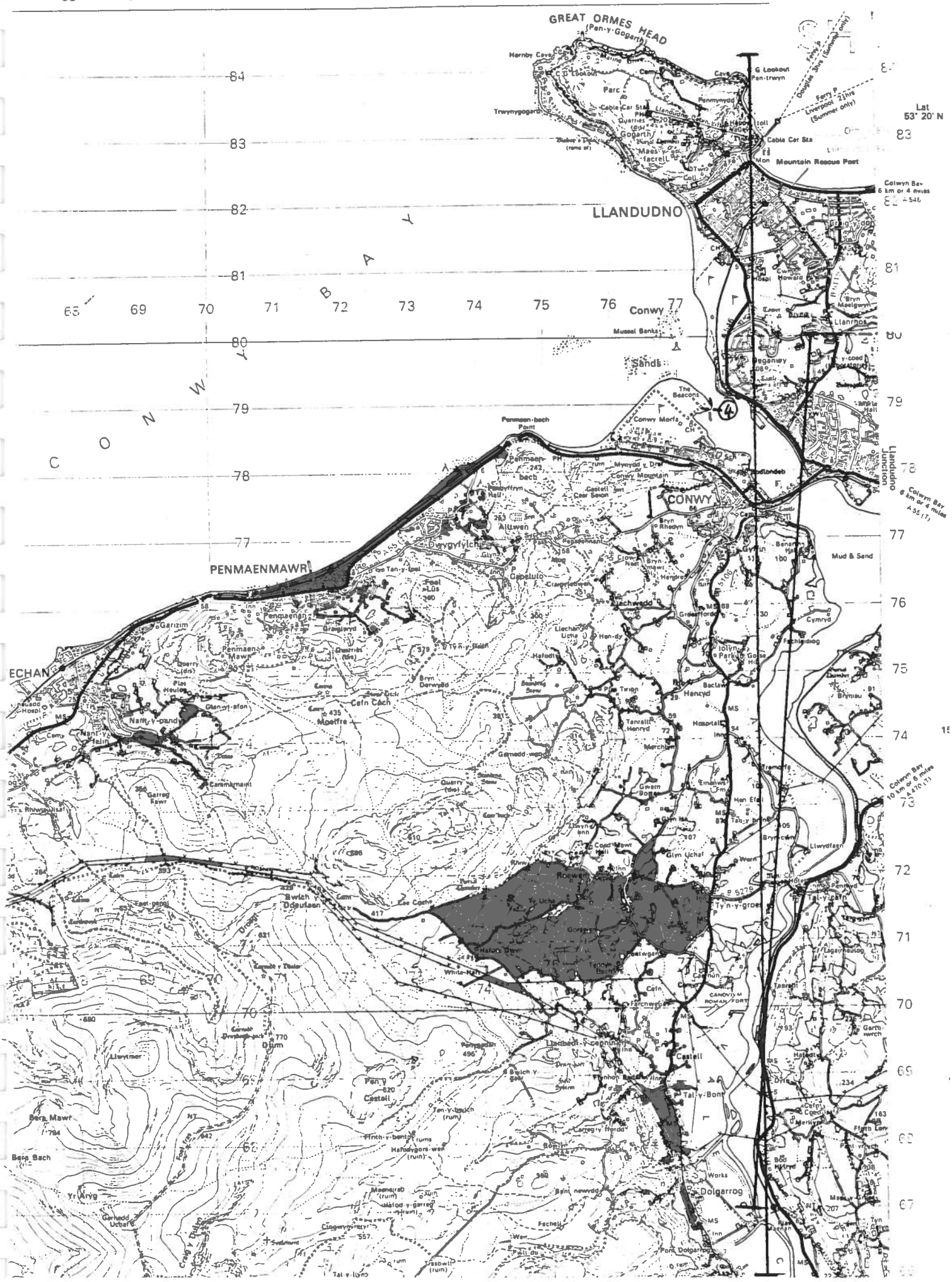

55'
Long 3° 50' W
Lat 53° 20' N
GREAT ORMES HEAD
(Pen-y-Gogarth)
LLANDUDNO
CONWY
PENMAENMAWR
Conwy
Sands
Mussel Banks
Mountain Rescue Post
Cable Car Sta
Lookout
Pen-trwyn
Ferry P
Douglas 3hrs (Summer only)
Ferry P
Liverpool 2hrs
(Summer only)
Colwyn Bay
6 km or 4 miles
A 546
Llandudno
Junction
Colwyn Bay
6 km or 4 miles
A 55 (T)
Colwyn Bay
10 km or 6 miles
A 470 (T)
Mud & Sand
Conwy Morfa
The Beacons
Penmaen-bach
Point
Penmaen-bach
Conwy Mountain
Cadnant
Dwygyfylchi
Capelulo
Penmaenan
Penmaen-Mawr
Garrizim
Gwern Borter
Bwlch Oerddwsen
Roewen
Nant-y-pandy
Nant-y-Felin
Cefn Cach
Moelfre
Castell
Tal-y-Bont
Dolgarrog
Pont Dolgarrog
Llanrhos
Deganwy
Llechwedd
Henryd
Tal-y-cafn
Llysfaen
Llanelian
Llysfaen
Hill
Llwydiarth
Llwydiarth
Esgairheulog
Tal-y-Fedw
Tyn-y-groes
Tal-y-Bont
Llwyn Bedw
Llwyn Bedw
Hall
Llwyn Onn
Coed Mawr
Hall
Glyn Uchaf
Glyn Isaf
Hen Efail
Bryn-celyn
Tremeifig
Rhiwlas
Rhiwlas Isaf
Cammamant
Garreg Fawr
Llwyn Onn
Uchaf
Llwyn Onn
Isaf
Llwyn Onn
Bach
Llwyn Onn
Canol
Llwyn Onn
Ucha
Llechard
Ucha
Llechard
Isa
Hen-dy
Hafodti
Hafodti
Bryn Derwydd
Bryn Rheolyn
Bryn Maelgwyn
Bryn Mawr
Bryn Rhedyn
Bryn Mawr
Bryn Mawr
Bryn Mawr

FIGURE 16

I. J. BARNSLEY, BIRKBECK AND UNIVERSITY COLLEGES.

AREA NO. 16

ROPOSED FLIGHT-LINES FOR THE MSS-85 AIRBORNE REMOTE SENSING CAMPAIGN — DIDCOT STUDY AREA.

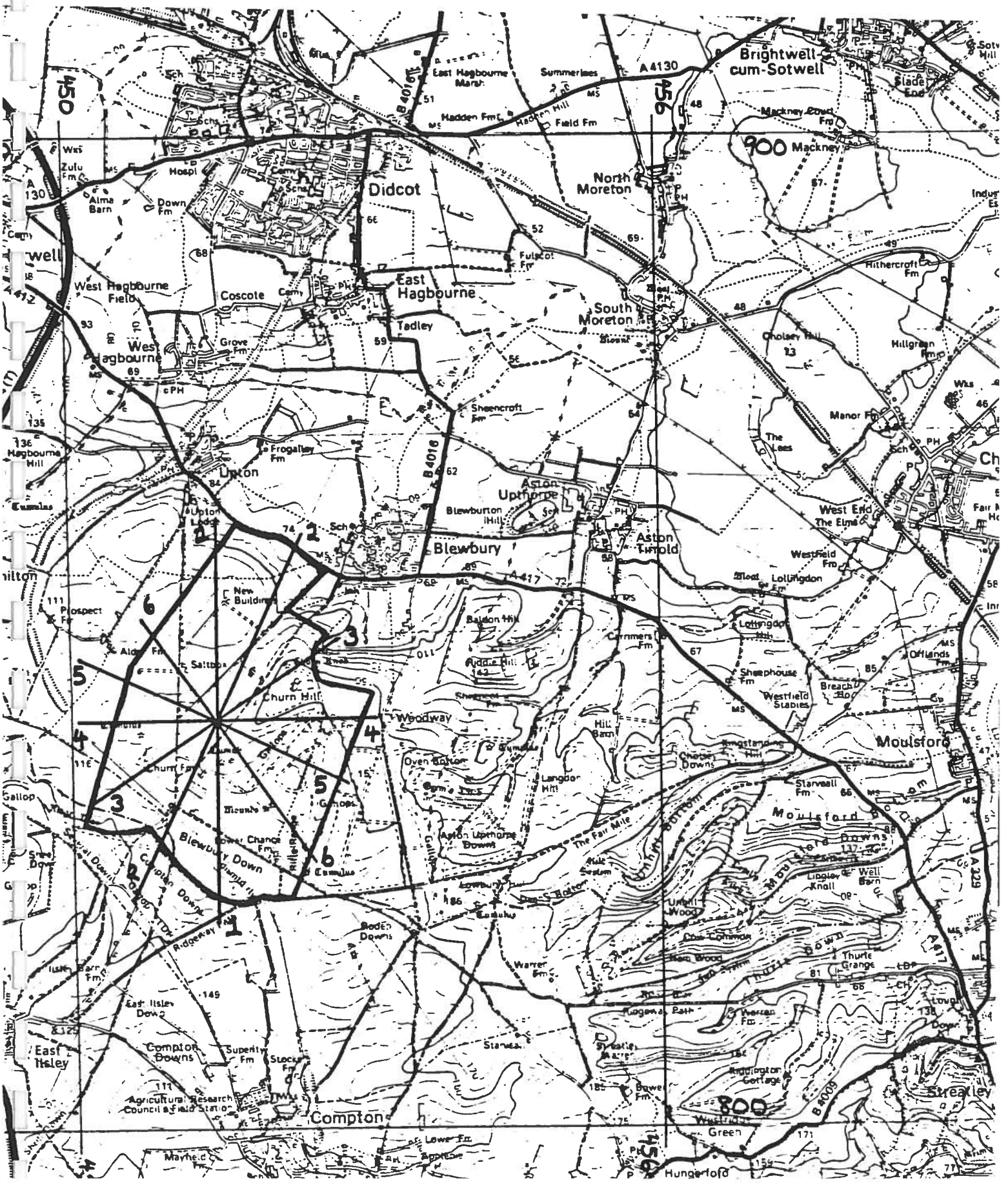


FIGURE 17

AREA NO. 17

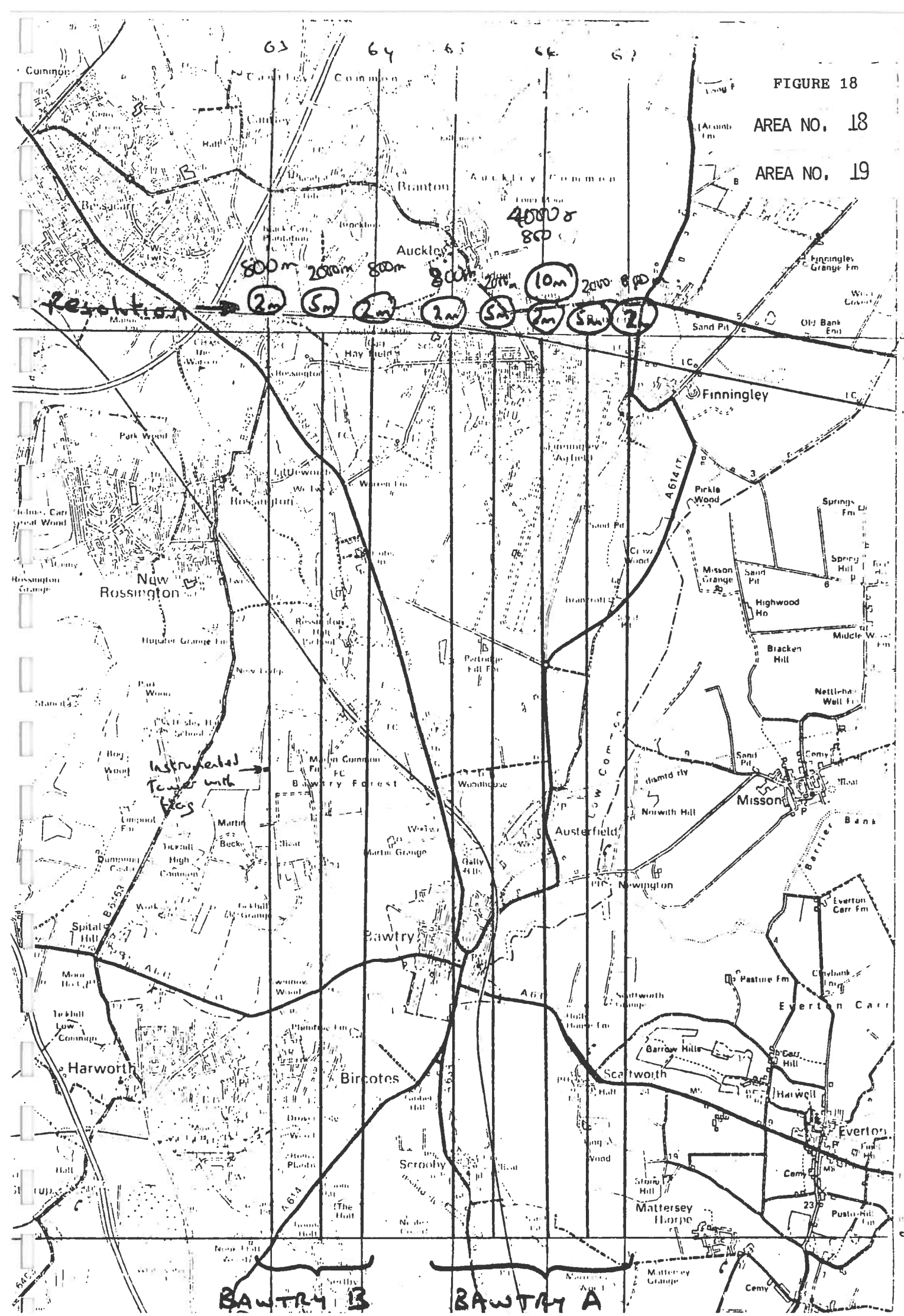
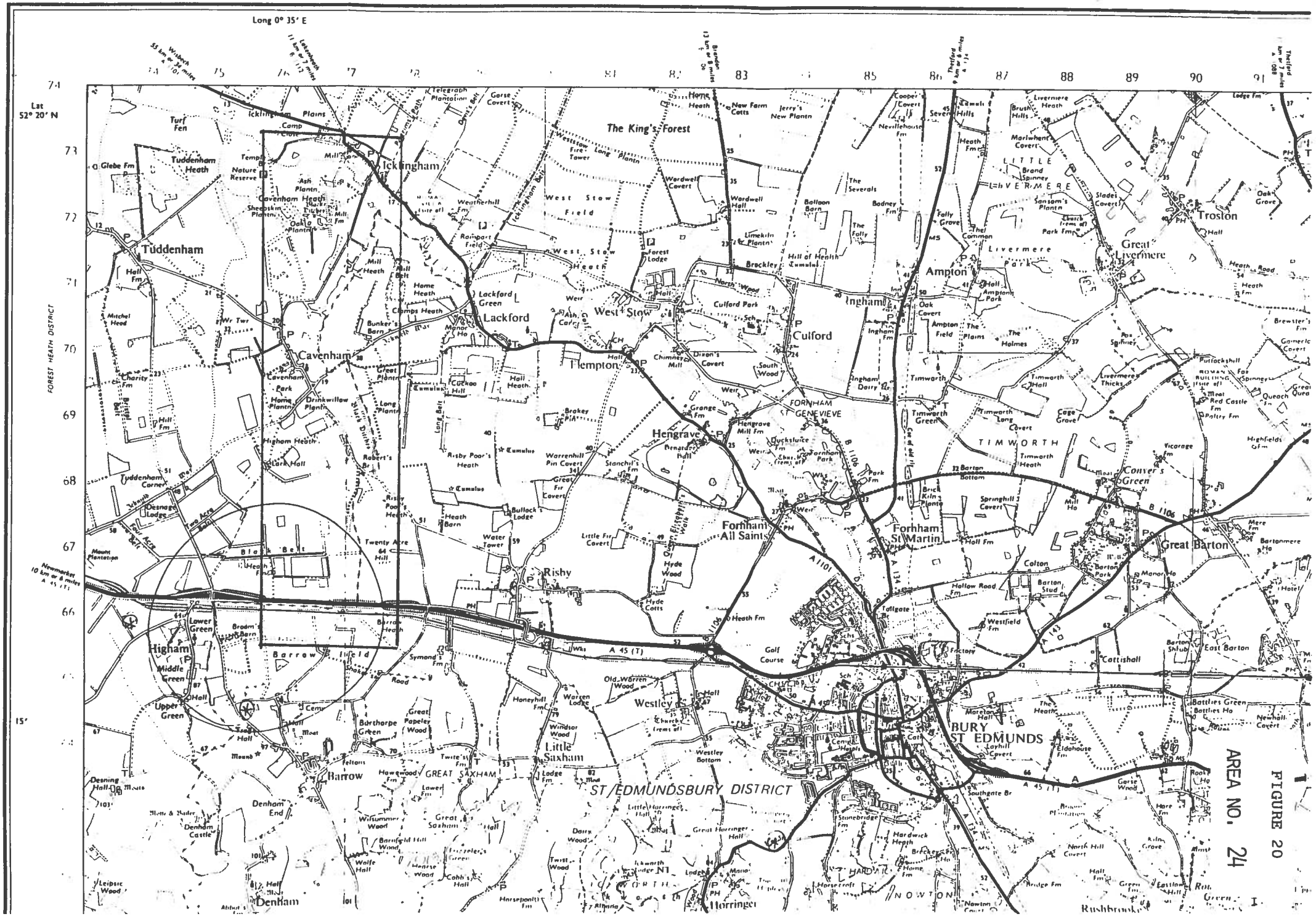
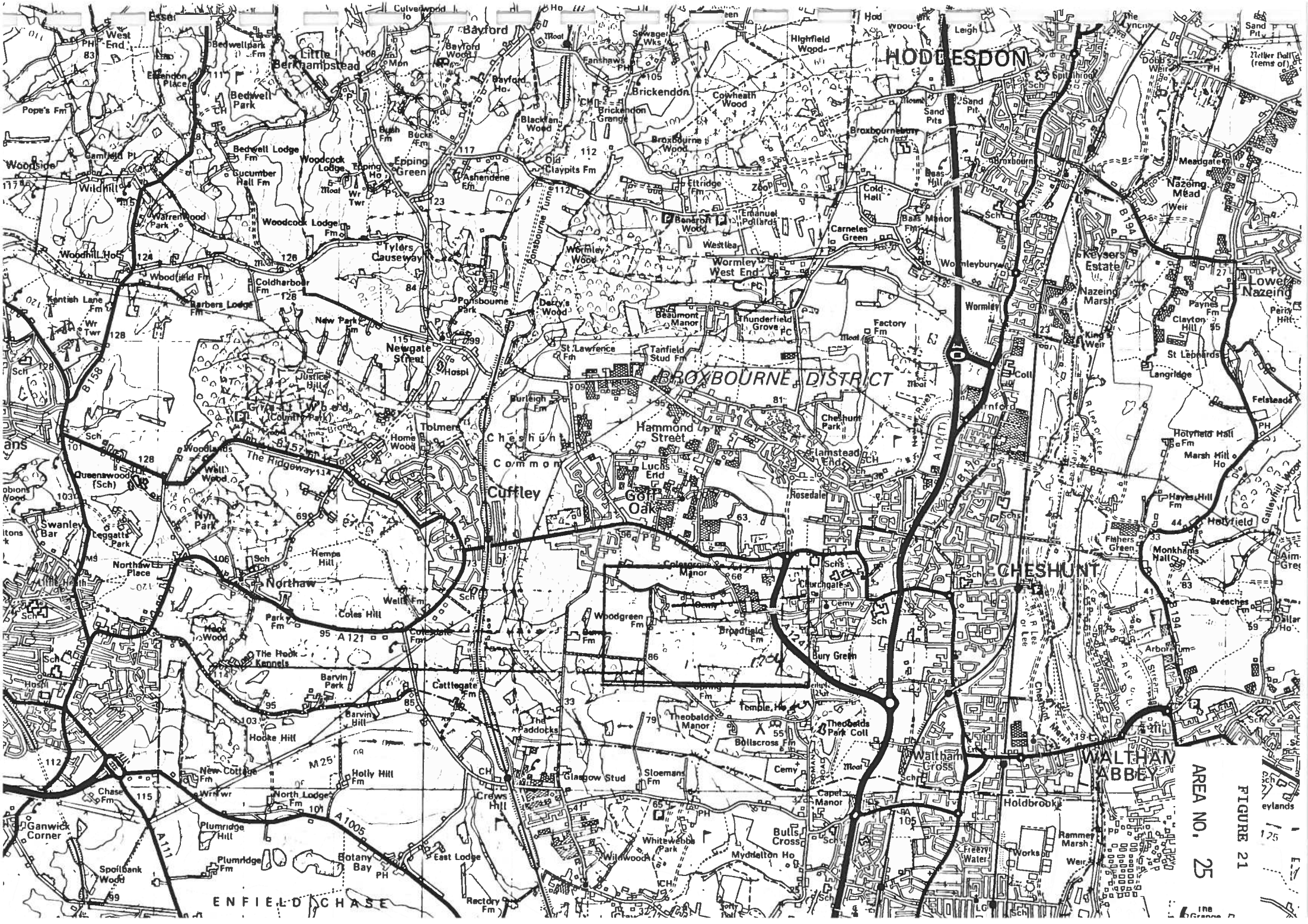


FIGURE 18
AREA NO. 18
AREA NO. 19
Resolution
800m 200m 800m 800m 200m 10m 200m 800m
2m 5m 2m 2m 5m 2m 5m 2
4000 x 800
Instrumented Tower with 4 legs
Finningley
New Rossington
Austerfield
Misson
Bawtry
Harworth
Bircotes
Scrooby
Scaftworth
Everton
Mattersey Thorpe
BAWTRY B
BAWTRY A

FIGURE 19

AREA NO. 23


Long 0° 35' E
Lat 52° 20' N
The King's Forest
Icklingham
Tuddenham
Tuddenham Heath
Lackford
Lackford Green
West Stow
Cavenham
Hengrave
Culford
Ingham
Ampton
Troston
Great Livermere
Fornham All Saints
Fornham St Martin
Great Barton
Rishy
Higham
Upper Green
Middle Green
Lower Green
Barrow
Westley
Little Saxham
Harrow
GREAT SAXHAM
Denham
Horringer
BURY ST EDMUNDS
ST EDMUNDSBURY DISTRICT
FORNHAM ST GENEVIEVE
TIMWORTH
NEWTON
HARDWICK
FOREST HEATH DISTRICT
Newmarket 10 km or 6 miles A 45 (T)
A 45 (T)
A1101
A 134
B 1106
AREA NO. 24
FIGURE 20



AREA NO. 25

FIGURE 21

FIGURE 22

AREA NO. 27

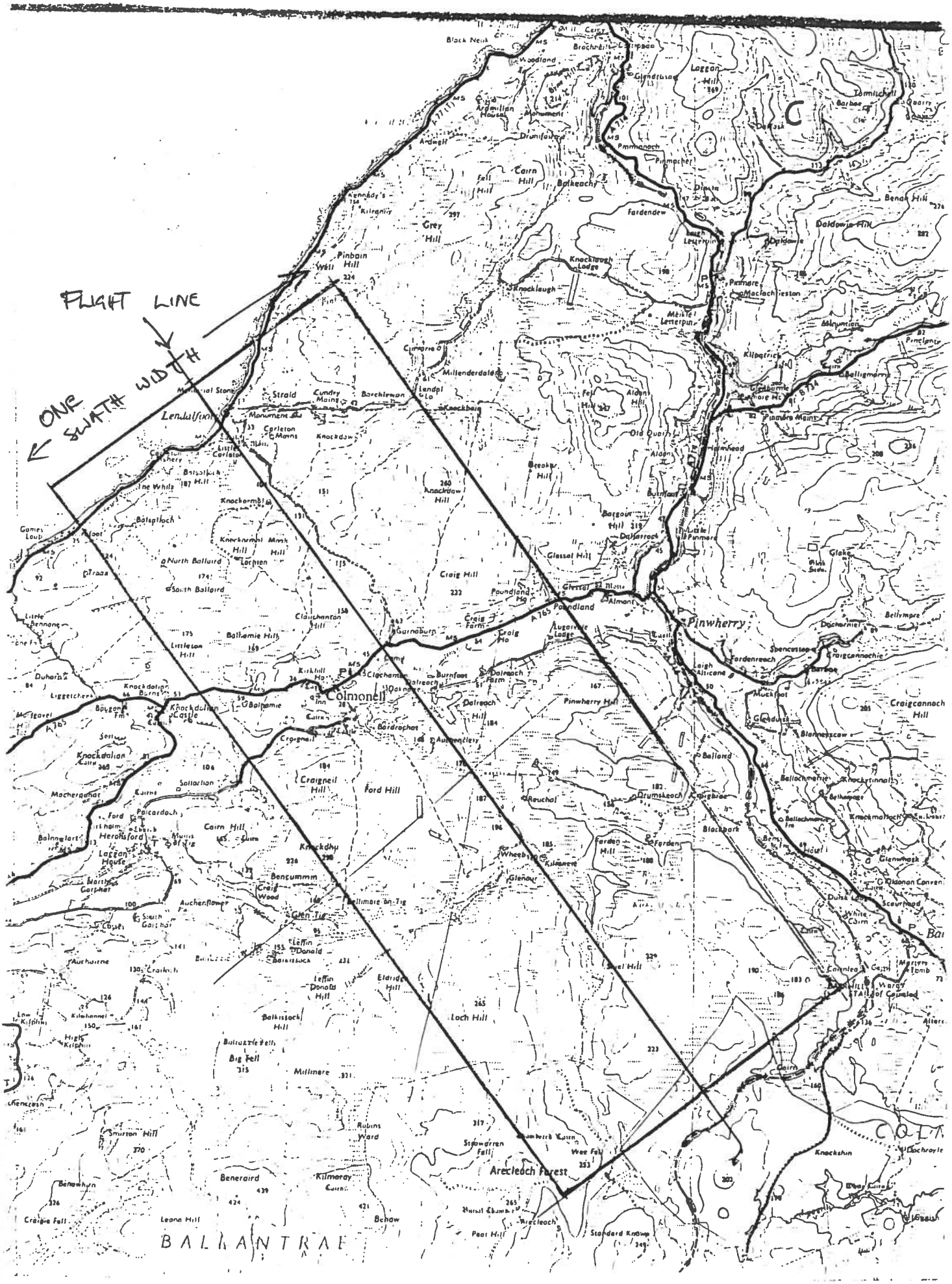


FIGURE 23

AREA NO. 28

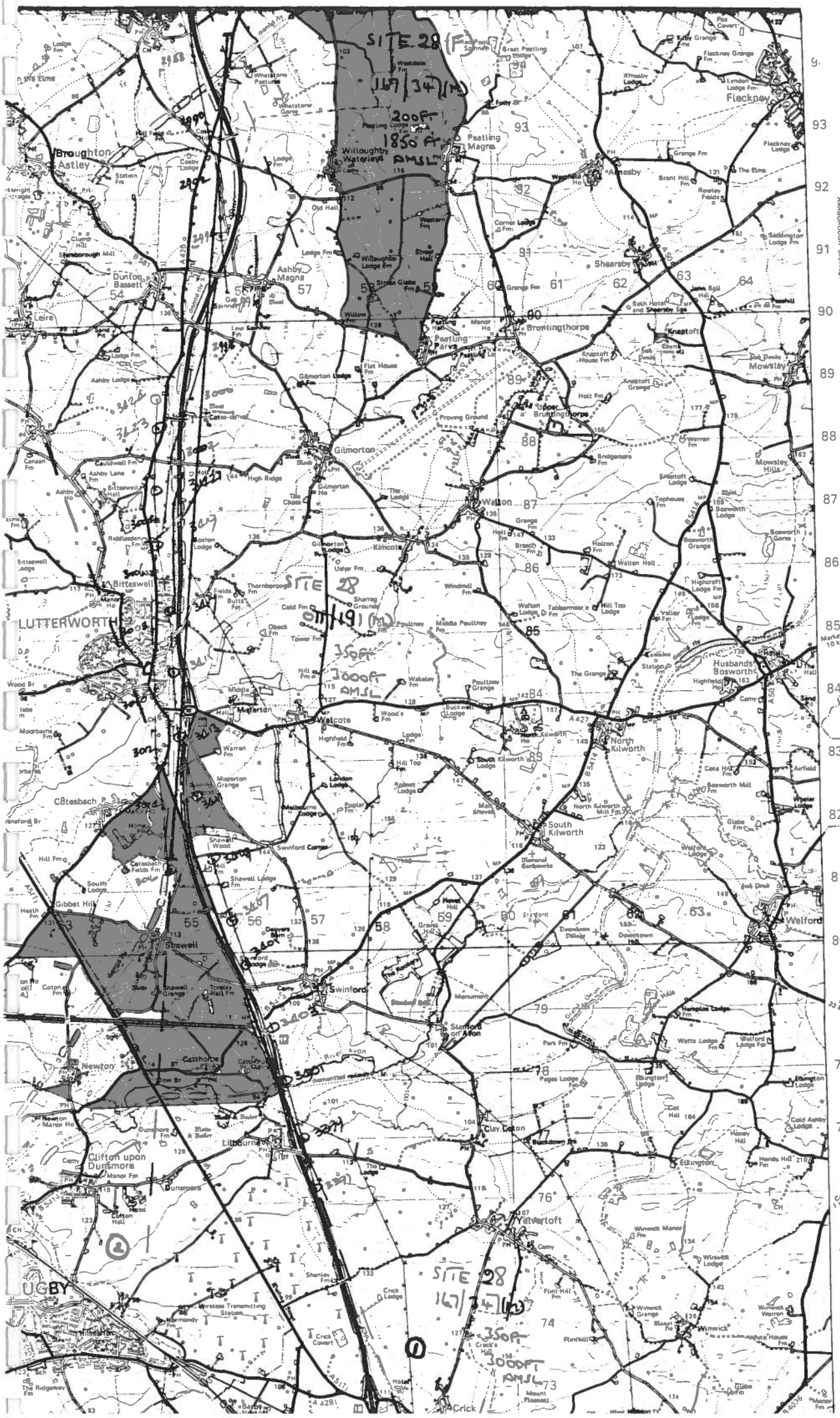


FIGURE 23/1


SITE 28
144/324(7)
300ft
1950ft AMSL
SITE 28
144/324(7)
300ft
1950ft AMSL
MILTON KEYNES DISTRICT

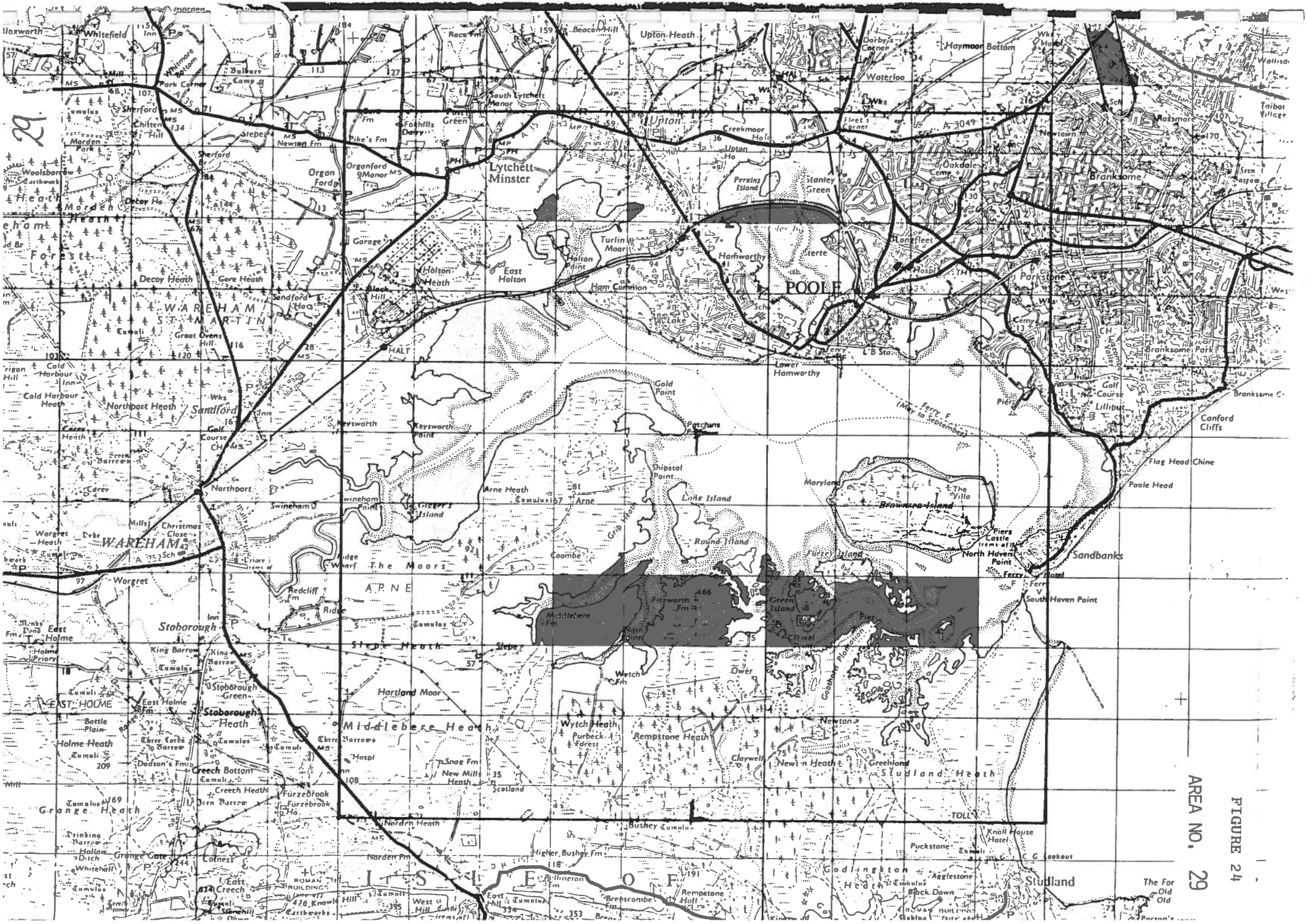


FIGURE 24

AREA NO. 29

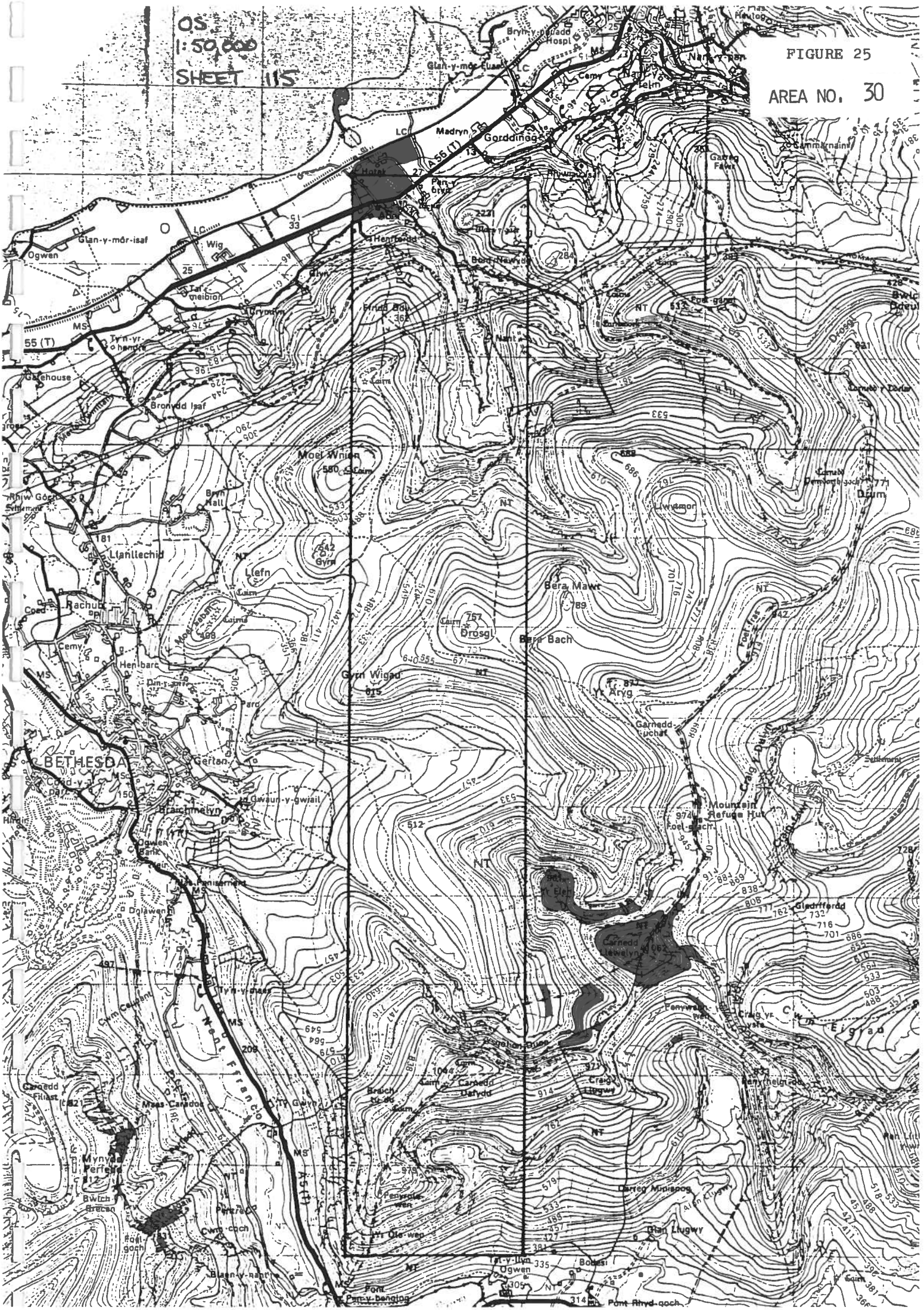

OS
1:50,000
SHEET 115
FIGURE 25
AREA NO. 30
A5 (T)
55 (T)
Madryn
Gorddinog
Glan-y-mor-isaf
Ogwen
Tal-y-maibion
Tyn-yr-hendre
Gatehouse
Bronydd Isaf
Moel Wnion
580
Llanllechid
Rachub
Llefn
Bera Mawr
Bera Bach
Drosgl
Gyrn Wigau
Yr Aryg
Garnedd-uchaf
BETHESDA
Braichmelyn
Gerlan
Mountain Refuge Hut
Glan Llugwy
Eigiau
Craig yr Ysfa
Pont Pen-y-benglog
Pont Rhyd-goch
Llyn Ogwen
Tal-y-llyn
Cwm Cneifion
Afon Ffrancon
Carnedd Dafydd
Carnedd Llewelyn
Yr Elen
Foel-goch
Mynydd Perfedd
Bwlch Brecan
Blaen-y-nant
Ty Gwyn
Maes-caradog
Carnedd y Filiast
Tyn-y-maes
Dolawen
Ogwen Bank
Cwm-coch
Yr Ole-wen
Penyrole-wen
Craig Lloegwy
Penyrhelgrodd
Llwytmor
Foel-fras
Drum
Carnedd Dafydd
Darreg Mwsogl
Gladrifferdd
Craig Dulyn
Craig Lloer
Craig Cwm-silyn
Cwm Silyn
Cwm Dulyn
Cwm Lloer
Cwm Clogwyn
Cwm Cywion
Cwm Tregalan
Cwm Llafar
Cwm Llugwy
Cwm Idwal
Cwm Bochlwyd
Cwm Bochlwyd Uchaf
Cwm Bochlwyd Isaf
Cwm Cneifion
Cwm Cywion
Cwm Tregalan
Cwm Llafar
Cwm Llugwy
Cwm Idwal
Cwm Bochlwyd
Cwm Bochlwyd Uchaf
Cwm Bochlwyd Isaf


FIGURE 26
AREA NO. 30B
ABERCONWY DISTRICT
Llanbedr-y-cennin
Castell
Dolgarrog
Trefriw
Tal-y-Bont
Tyn-y-groes
Eglwys
Mountain Rescue Telephone
Wells & Baths (Chalybeate)
Mynydd Deulyn
Pen Llithrig y-wrach
Carnedd Dafydd
Carnedd Llewelyn
Foel-fras
Foel-grach
Bwlch y Ddeufaen
Roman Road
Tal-y-bont
Pont Dolgarrog
Gwydyr Uchaf Forestry Exhibition
Forest Trail
A5 (T)
A470 (T)

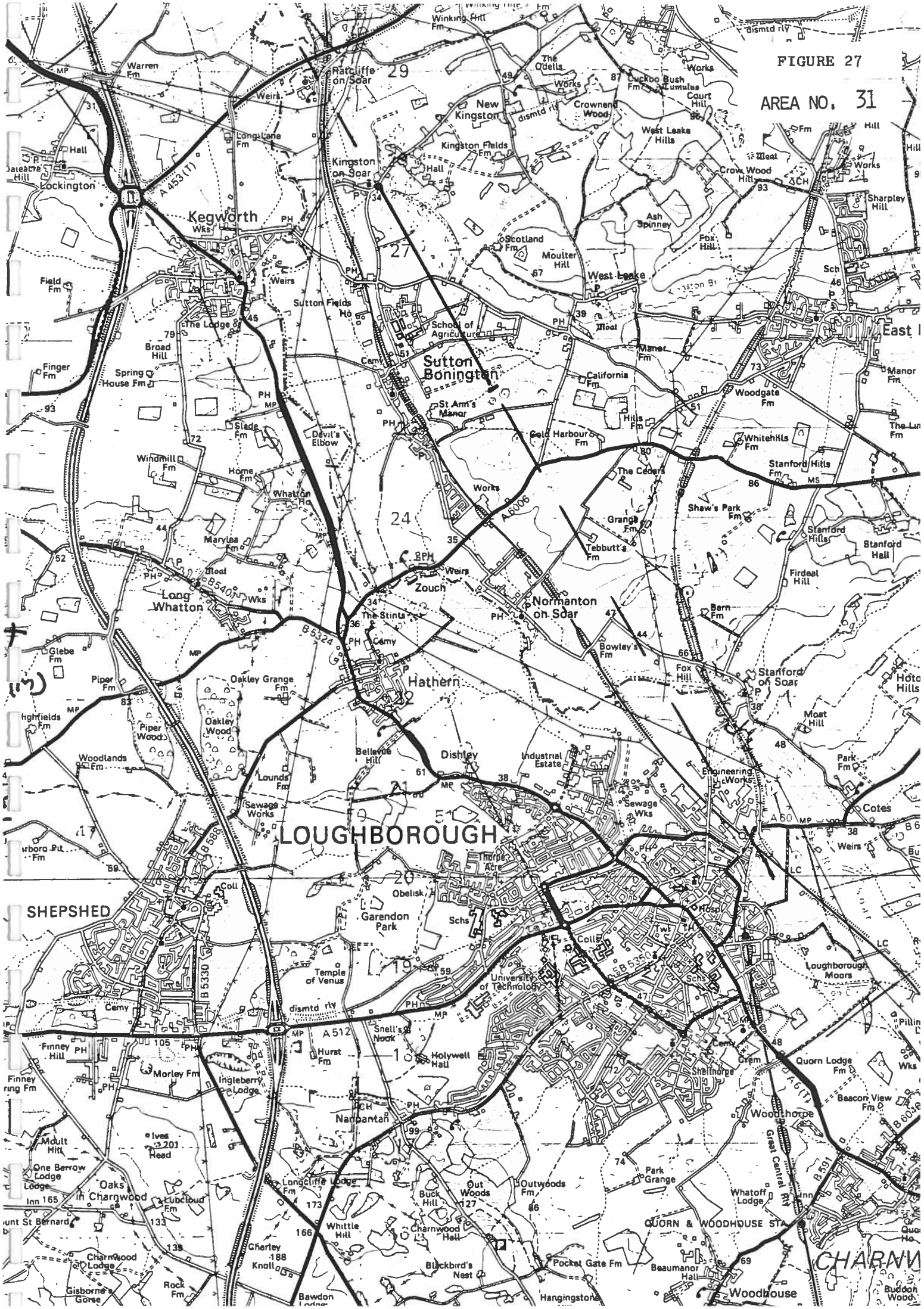


FIGURE 27
AREA NO. 31
LOUGHBOROUGH
SHEPSHED
CHARNWOOD
Kegworth
Kingston on Soar
Ratcliffe on Soar
Sutton Bonington
Normanton on Soar
Zouch
Long Whatton
Hathern
Stanford on Soar
Woodthorpe
Woodhouse
QUORN & WOODHOUSE STA
Garendon Park
Nanpantan
Holywell Hall
Charnwood Hall
Lockington
New Kingston
West Leake
Ash Spinney
Moulter Hill
Scotland Fm
Crownend Wood
Cuckoo Bush Fm
Crow Wood Hill
Sharpley Hill
Fox Hill
Manor Fm
California
Woodgate Fm
Whitehills Fm
Stanford Hills Fm
The Cedars
Shaw's Park Fm
Grange Fm
Tebbutt's Fm
Bowley's Fm
Barn Fm
Firdeal Hill
Stanford Hall
Moat Hill
Park Fm
Cotes
Loughborough Moors
Quorn Lodge Fm
Beacon View Fm
Whatoff Lodge
Park Grange
Outwoods Fm
Out Woods
Buck Hill
Whittle Hill
Beaumanor Hall
Pocket Gate Fm
Blackbird's Nest
Hangingstone
Bawdon Lodge
Rock Fm
Gisborne's Gorse
Charnwood Lodge
Charley
Knoll
Longcliffe Lodge
Lubcloud Fm
Oaks in Charnwood
One Barrow Lodge
Mault Hill
Ives Head
Finney Hill
Finney Fm
Morley Fm
Ingleberry Lodge
Hurst Fm
Snell's Nook
Temple of Venus
Obelisk
Bellevue Hill
Dishley
Industrial Estate
Engineering Works
Sewage Works
Lounds Fm
Oakley Wood
Oakley Grange Fm
Piper Wood
Piper Fm
Woodlands Fm
Glebe Fm
Highfields Fm
Marylea Fm
Home Fm
Windmill Fm
Broad Hill
Finger Fm
Spring House Fm
Field Fm
Slade Fm
Devil's Elbow
Whatton Ho
Sutton Fields Ho
School of Agriculture
St Ann's Manor
Cold Harbour Fm
Hills Fm
Manor Fm
Weirs
Long Lane Fm
Warren Fm
Kingston Fields Fm
Crownend Wood
Court Hill
West Leake Hills
Crow Wood Hill
Ash Spinney
Fox Hill
Sharpley Hill
Stanford Hills
Firdeal Hill
Stanford Hall
Moat Hill
Park Fm
Cotes
Loughborough Moors
Quorn Lodge Fm
Beacon View Fm
Whatoff Lodge
Park Grange
Outwoods Fm
Out Woods
Buck Hill
Whittle Hill
Beaumanor Hall
Pocket Gate Fm
Blackbird's Nest
Hangingstone
Bawdon Lodge
Rock Fm
Gisborne's Gorse
Charnwood Lodge
Charley
Knoll
Longcliffe Lodge
Lubcloud Fm
Oaks in Charnwood
One Barrow Lodge
Mault Hill
Ives Head
Finney Hill
Finney Fm
Morley Fm
Ingleberry Lodge
Hurst Fm
Snell's Nook
Temple of Venus
Obelisk
Bellevue Hill
Dishley
Industrial Estate
Engineering Works
Sewage Works
Lounds Fm
Oakley Wood
Oakley Grange Fm
Piper Wood
Piper Fm
Woodlands Fm
Glebe Fm
Highfields Fm
Marylea Fm
Home Fm
Windmill Fm
Broad Hill
Finger Fm
Spring House Fm
Field Fm
Slade Fm
Devil's Elbow
Whatton Ho
Sutton Fields Ho
School of Agriculture
St Ann's Manor
Cold Harbour Fm
Hills Fm
Manor Fm
Weirs
Long Lane Fm
Warren Fm
Kingston Fields Fm
Crownend Wood
Court Hill
West Leake Hills
Crow Wood Hill
Sharpley Hill
Fox Hill
Manor Fm
California
Woodgate Fm
Whitehills Fm
Stanford Hills Fm
The Cedars
Shaw's Park Fm
Grange Fm
Tebbutt's Fm
Bowley's Fm
Barn Fm

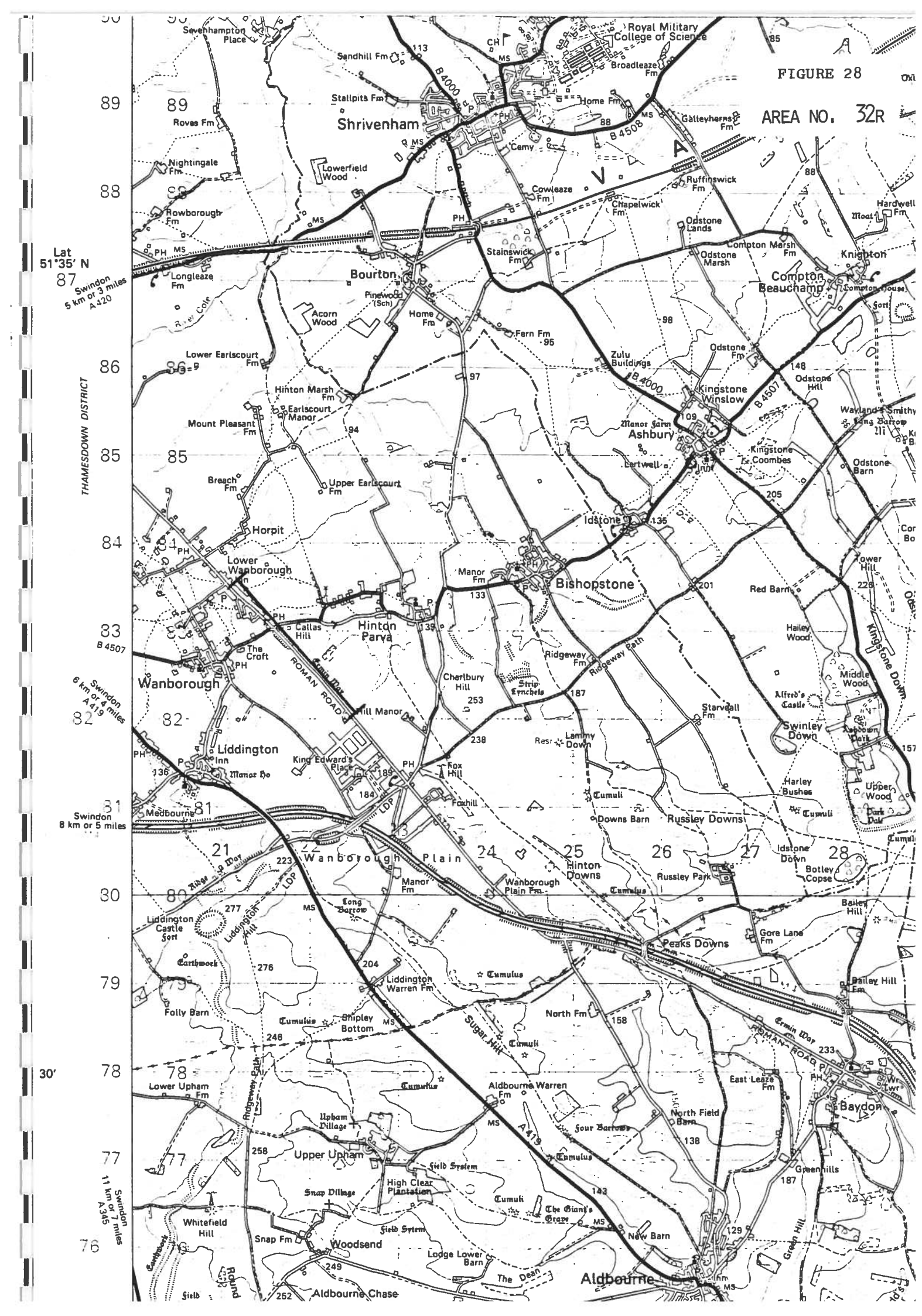


FIGURE 28
AREA NO. 32R
Lat 51°35' N
THAMESDOWN DISTRICT
Shrivenham
Bourton
Compton Beauchamp
Kingstone Winslow
Ashbury
Bishopstone
Hinton Parva
Wanborough
Liddington
Medbourne
Wanborough Plain
Hinton Downs
Peaks Downs
Russley Downs
Swinley Down
Kingstone Down
Aldbourne
Baydon
Upham
Upper Upham
Woodsend
Aldbourne Chase
Royal Military College of Science
Sevenhampton Place
Sandhill Fm
Stallpits Fm
Roves Fm
Nightingale Fm
Lowerfield Wood
Rowborough Fm
Longleaze Fm
Acorn Wood
Pinewood (Sch)
Home Fm
Fern Fm
Lower Earlscourt Fm
Hinton Marsh Fm
Earlscourt Manor
Mount Pleasant Fm
Breach Fm
Upper Earlscourt Fm
Horpit
Lower Wanborough Fm
Callas Hill
The Croft
Hill Manor
Manor Fm
Cherlbury Hill
Strip Lynchets
Ridgeway Fm
Ridgeway Path
Starveall Fm
Lammy Down
Harley Bushes
Downs Barn
Idstone
Manor Farm
Lertwell
Kingstone Coombes
Odstone Barn
Red Barn
Hailey Wood
Middle Wood
Alfred's Castle
Ashdown Park
Upper Wood
Idstone Down
Botley Copse
Russley Park
Hinton Downs
Wanborough Plain Fm
Manor Fm
Long Barrow
Liddington Castle Fort
Earthwork
Liddington Hill
Liddington Warren Fm
Folly Barn
Snipley Bottom
Sugar Hill
North Fm
Gore Lane Fm
Bailey Hill
Bailey Hill Fm
East Leaze Fm
North Field Barn
Four Barrows
Aldbourne Warren Fm
Lower Upham Fm
Upham Village
Field System
High Clear Plantation
Snap Village
Snap Fm
Whitefield Hill
Round Field
Lodge Lower Barn
The Dean
The Giant's Grave
New Barn
Greenhills
Green Hill
Ermin Way
ROMAN ROAD
Ridge Way
LDP
Swindon 6 km or 4 miles A419
Swindon 8 km or 5 miles
Swindon 11 km or 7 miles A345
Swindon 5 km or 3 miles A420
B 4000
B 4507
A 419
Cowleaze Fm
Chapelwick Fm
Ruffinswick Fm
Odstone Lands
Odstone Marsh
Compton Marsh Fm
Stainswick Fm
Zulu Buildings
Odstone Fm
Odstone Hill
Hardwell Fm
Moat
Knighton
Compton House
Wayland's Smithy Long Barrow
Galleyherns Fm
Home Fm
Camy
Broadleaze Fm
Cumuli
Tumulus
Field System

FIGURE 29

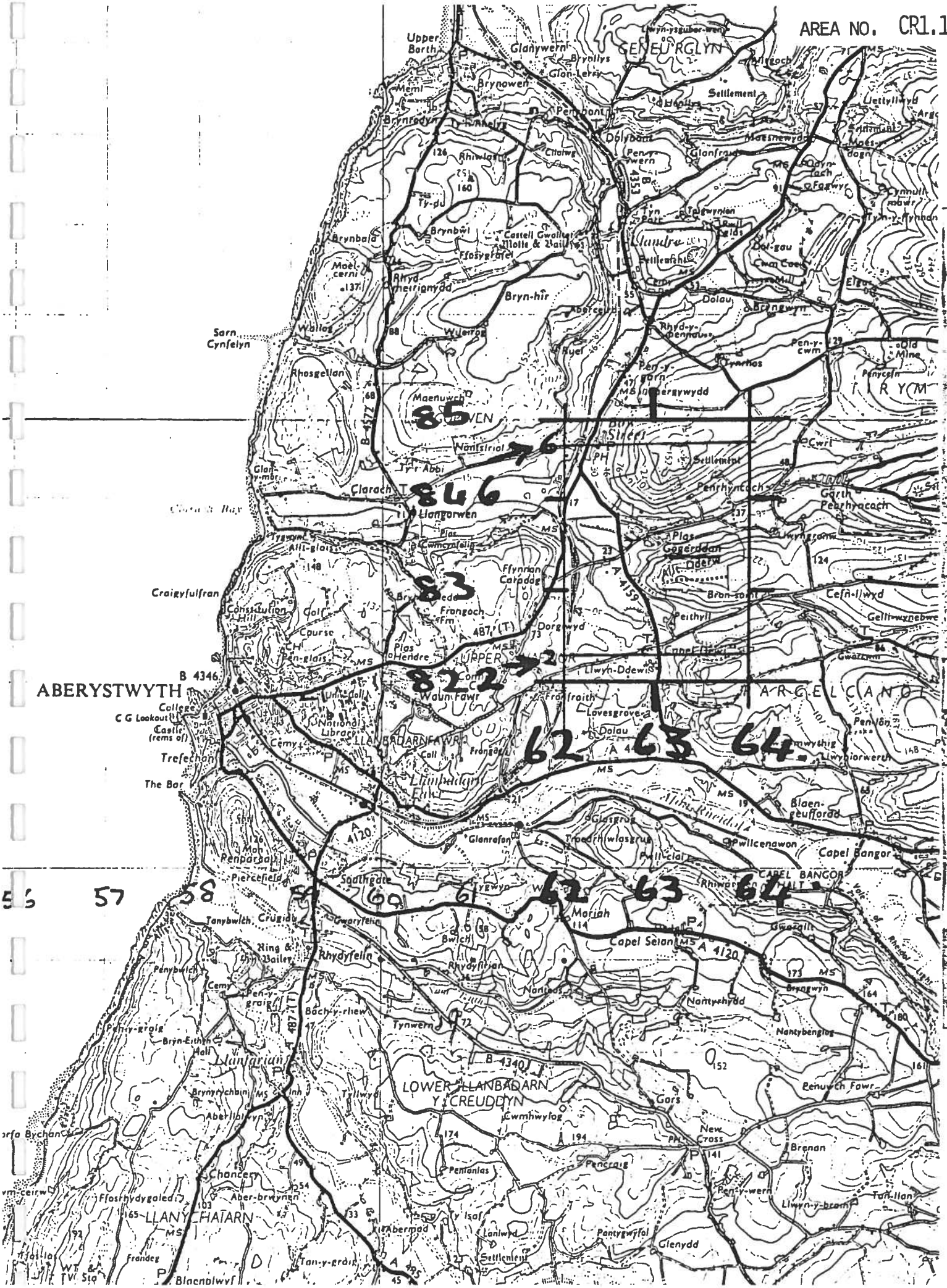
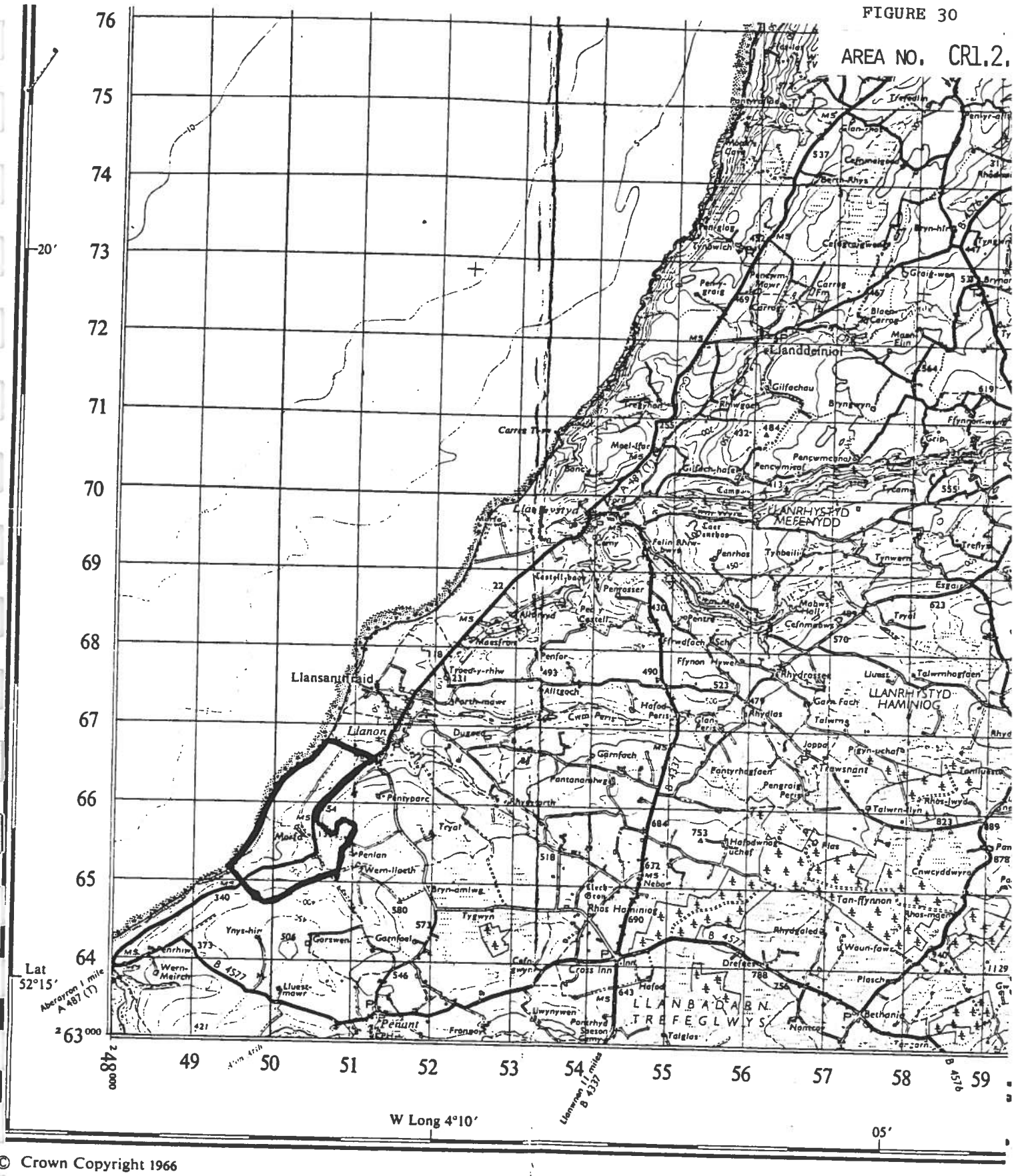
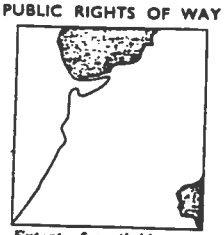

AREA NO. CR1.1.
ABERYSTWYTH
LLANBADARN FAWR
LOWER LLANBADARN
Y CREUDDYN
CAPEL BANGOR
GOGERDDAN
LLANYCHAIARN
Sarn Cynfelyn
Craigyfulfran
Trefechan
The Bar
Penparcau
Rhydyfelin
Capel Seion
Capel Bangor
Mariah
Gors
Penuwch Fawr
Brenan
Penrhyncoch
Garth Penrhyncoch
Plas Gogerddan
Waun Fawr
Llanfarian
Chancery
Blaenplwyf
Glenydd
Pantygwyfol
Penrhos
Penrallt
Penglais
Llanbadarn Fynydd
Llanbadarn Fawr
Llanbadarn Fach
Llanbadarn Trefeglwys
Llanbadarn Odwyn
Llanbadarn Odwyn
Llanbadarn Odwyn

FIGURE 30

AREA NO. CR1.2.

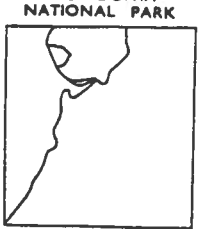


PUBLIC RIGHTS OF WAY



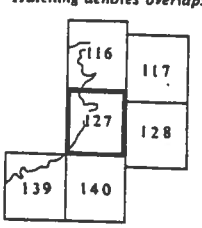
Extent of available information

SNOWDONIA NATIONAL PARK



Designated area, Confirmation Order 1951. Boundary

Index to adjoining sheets
Hatching denotes overlaps



Differer

1°47′
1°19′
1°46′
1°18′

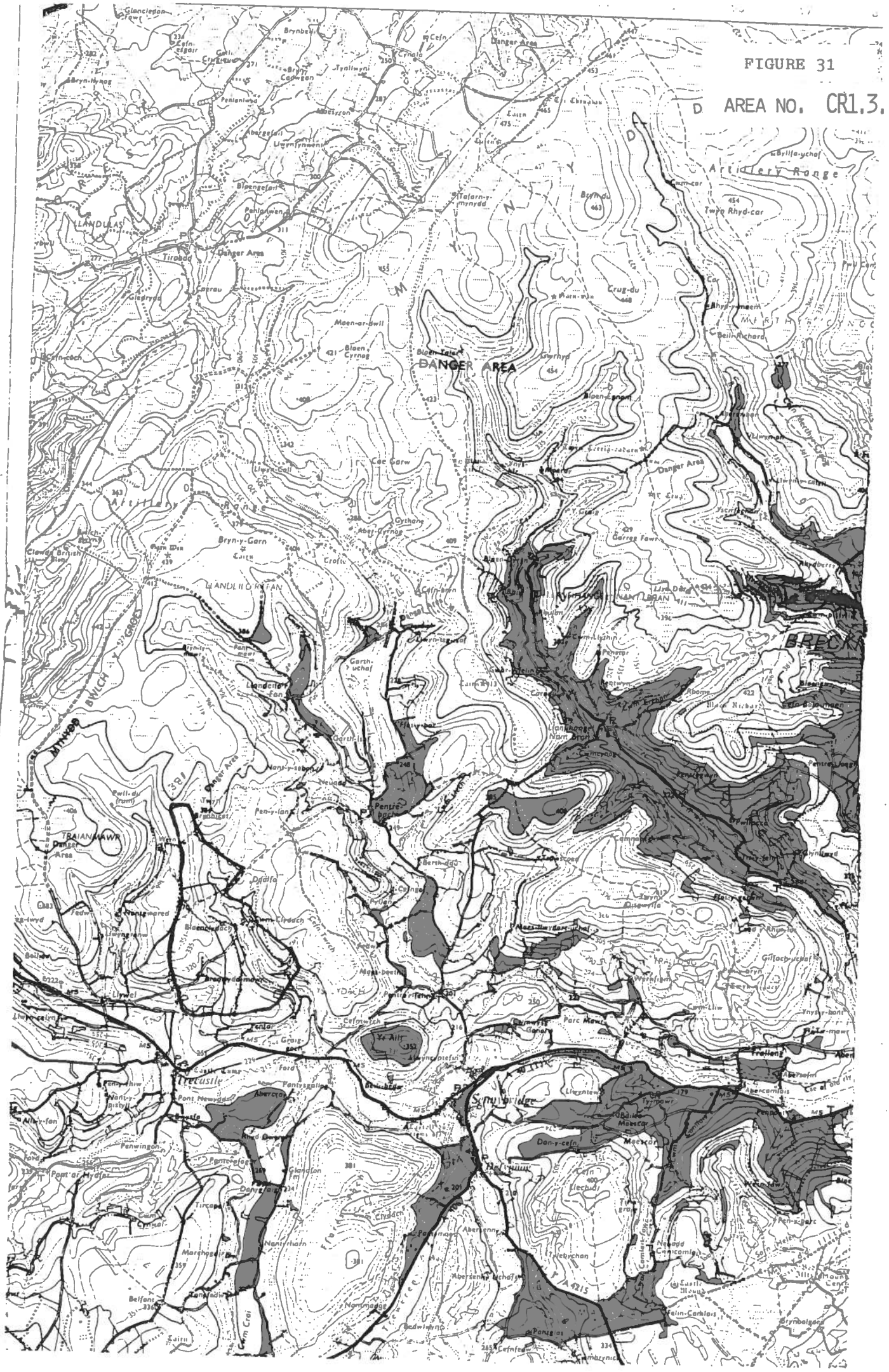
al decreasing

REVISION INFORMATION

...lly revised 1964
except Low Water Mark
which was plotted from
... photographs dated June 1965
...ajor roads revised 1965

FIGURE 31

AREA NO. CR1.3.

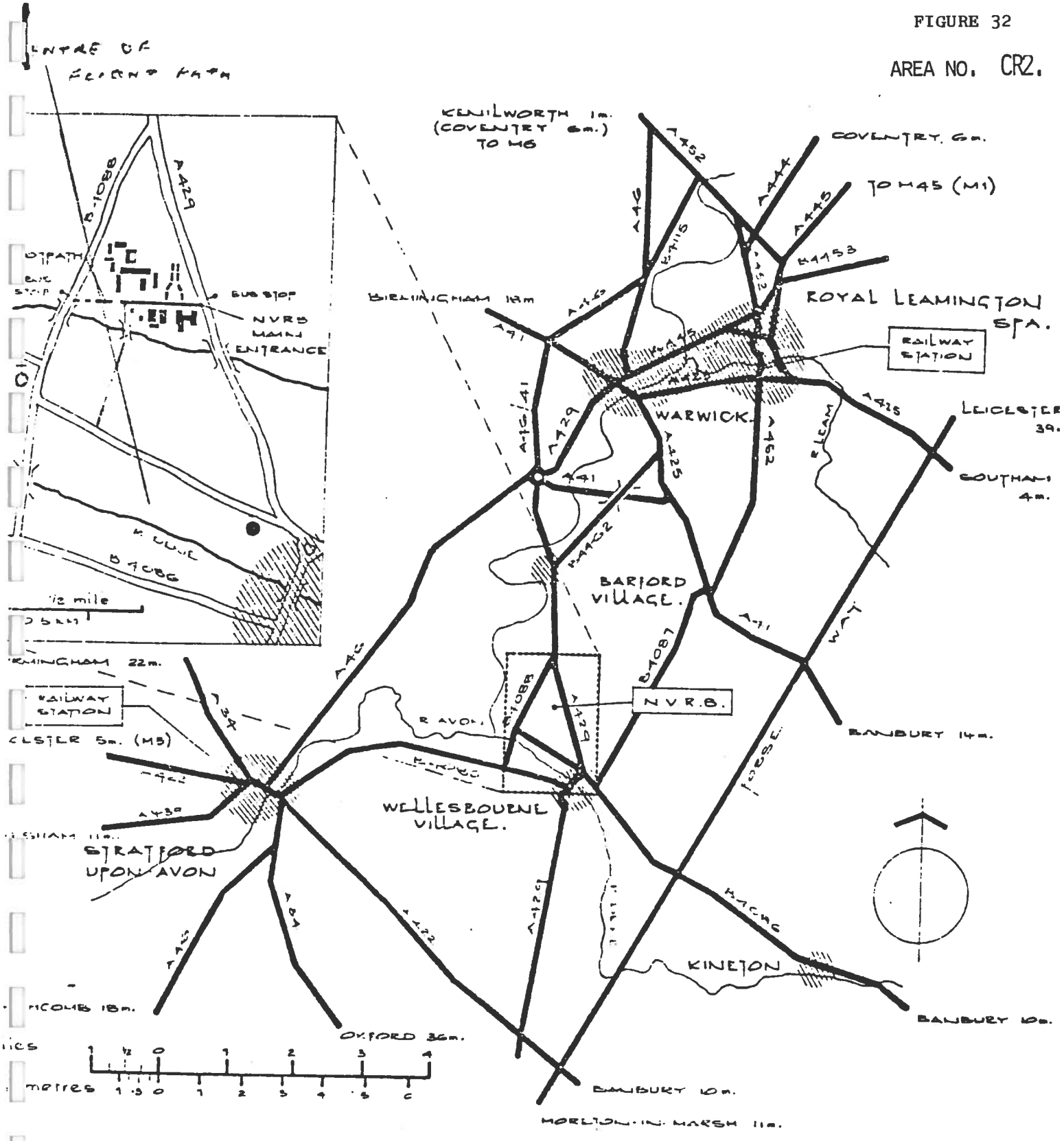


1400
OR

305

FIGURE 32

AREA NO. CR2.



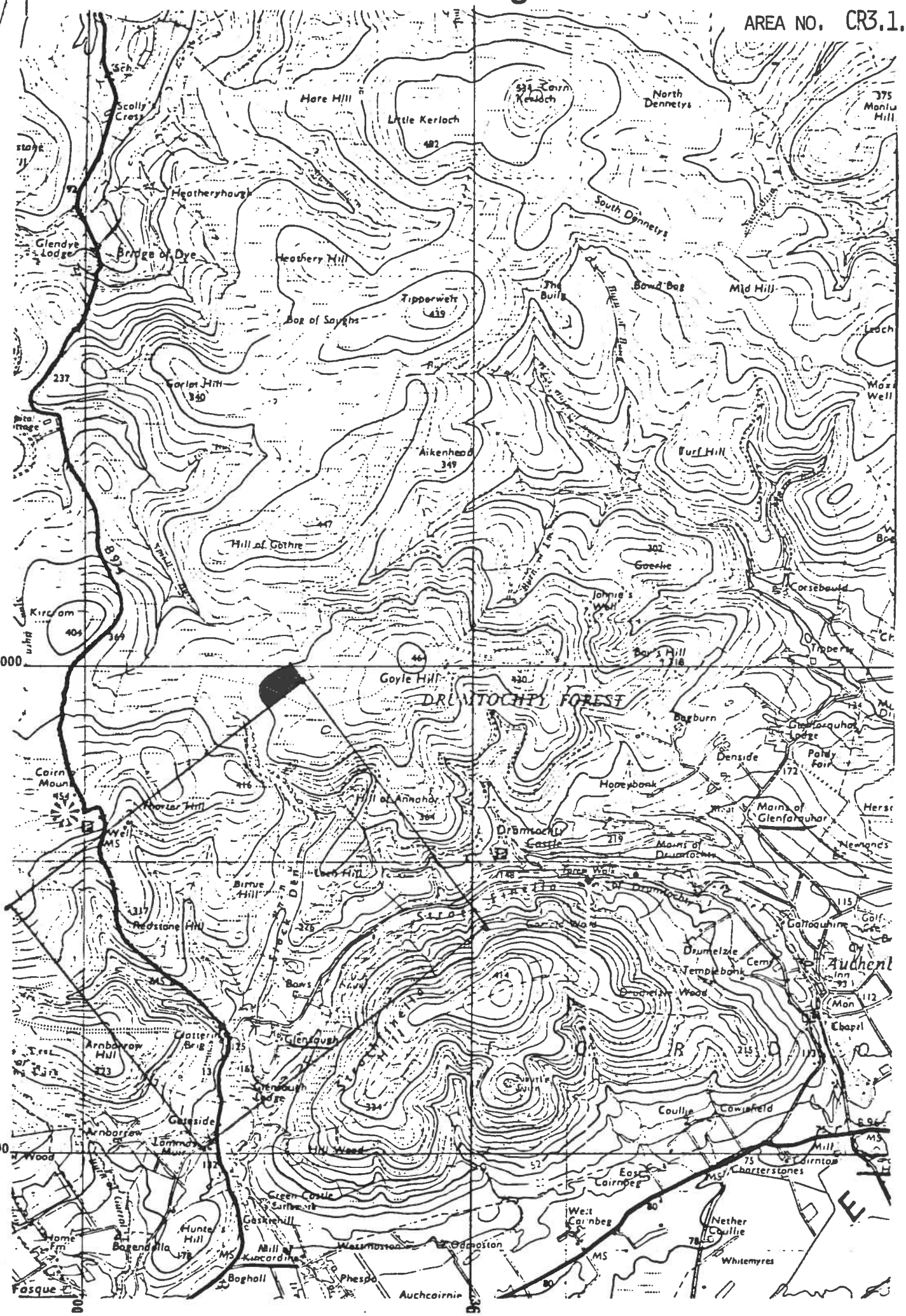
NATIONAL VEGETABLE RESEARCH STATION
WELLESBOURNE, WARWICK
Tel: Wellesbourne 382

Sheet 45

Glen Saugh

FIGURE 33

AREA NO. CR3.1.



N

(2)

Sheets 74/80

Sourhope

FIGURE 34

AREA NO. CR3.2.

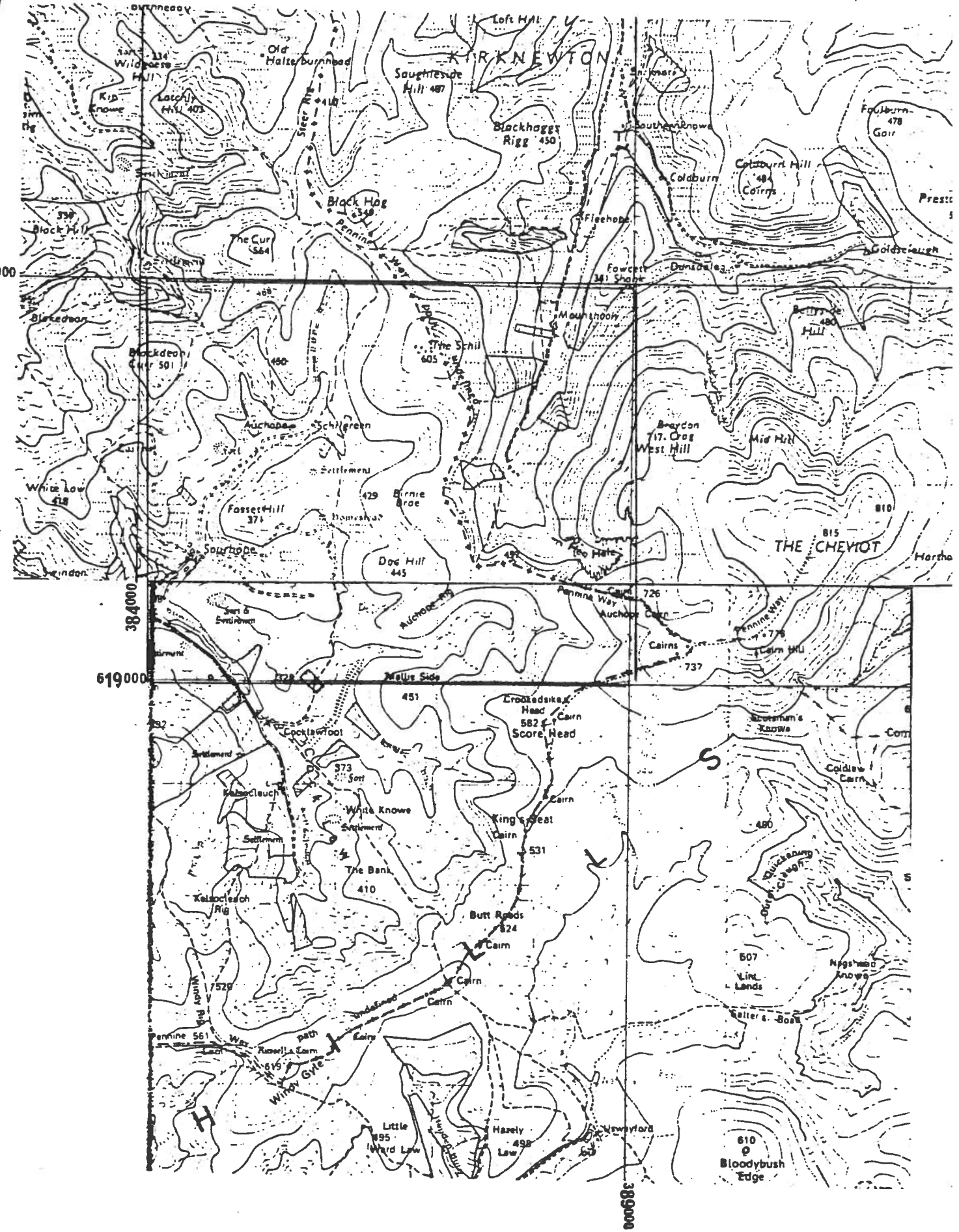


FIGURE 35

AREA NO. CR3.3

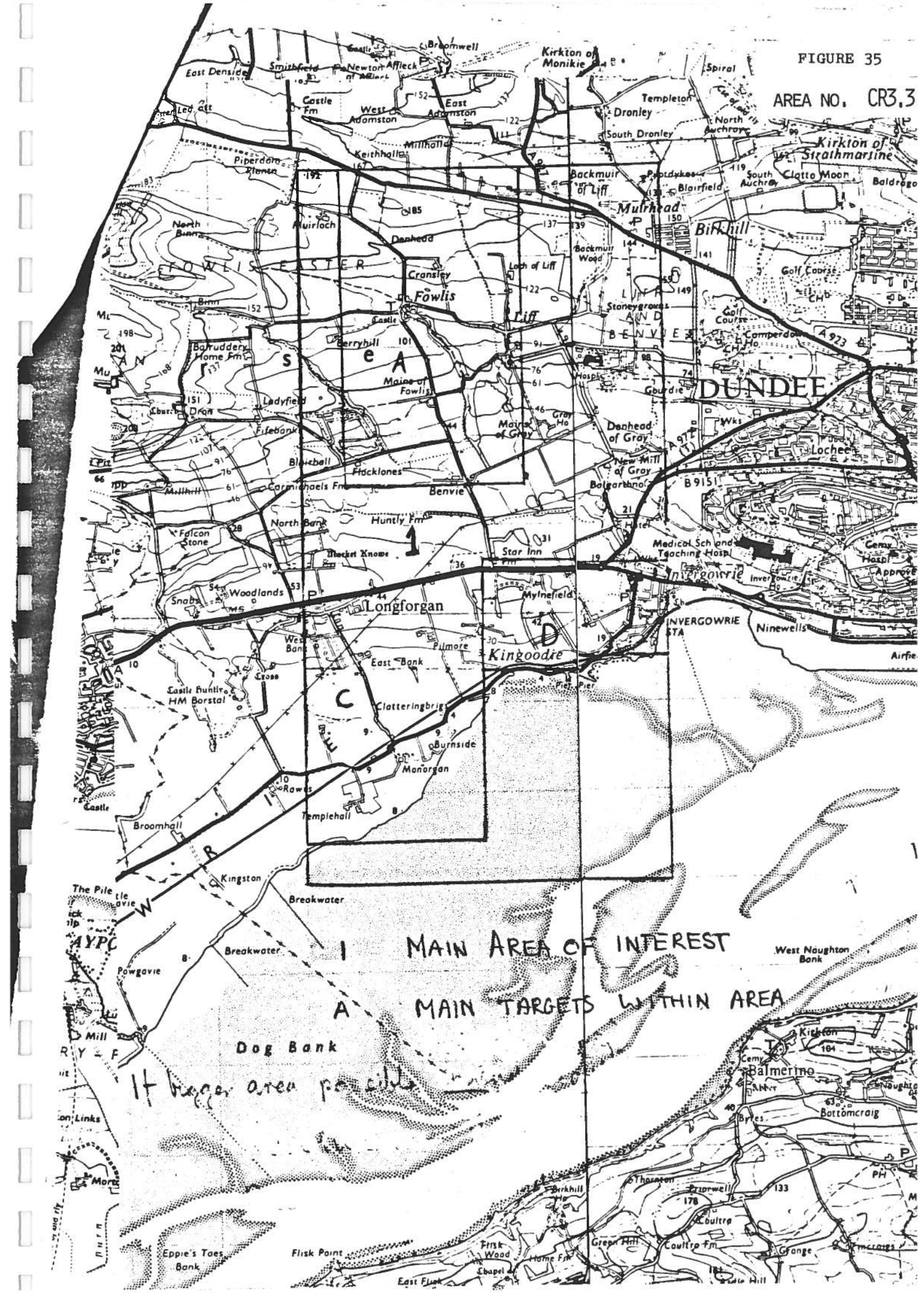
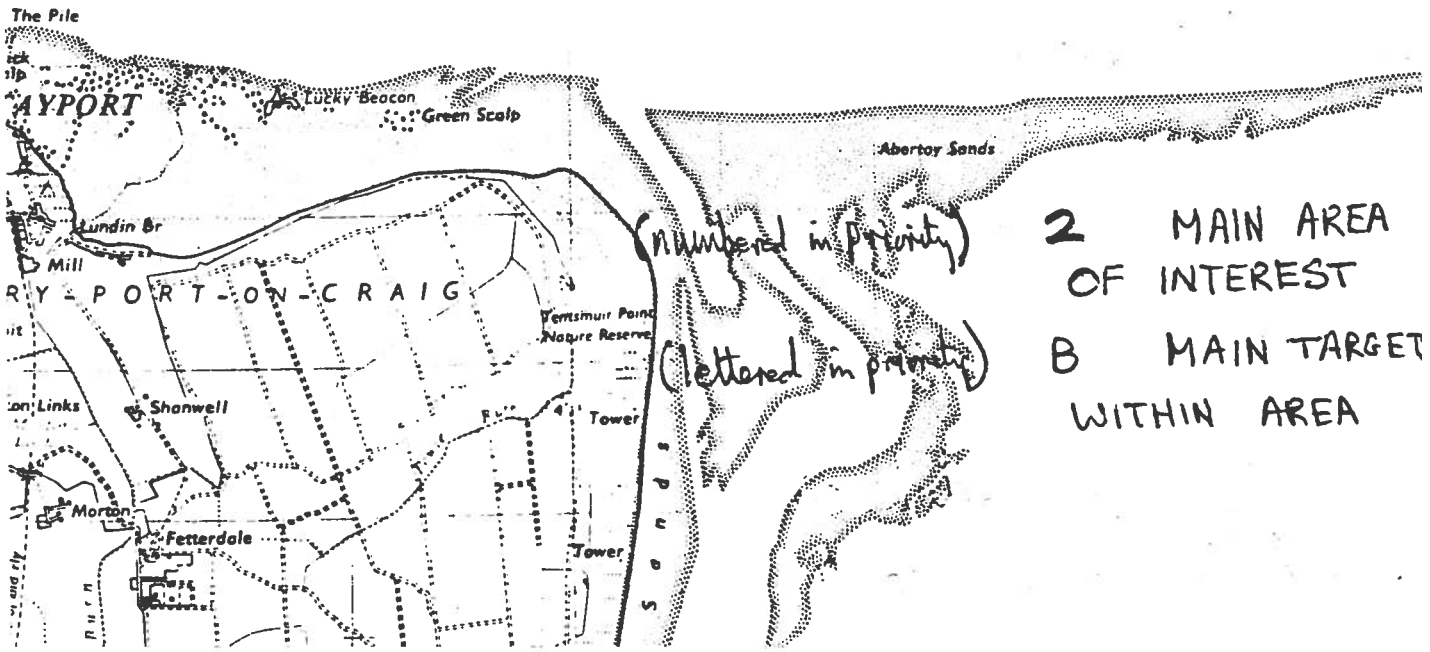
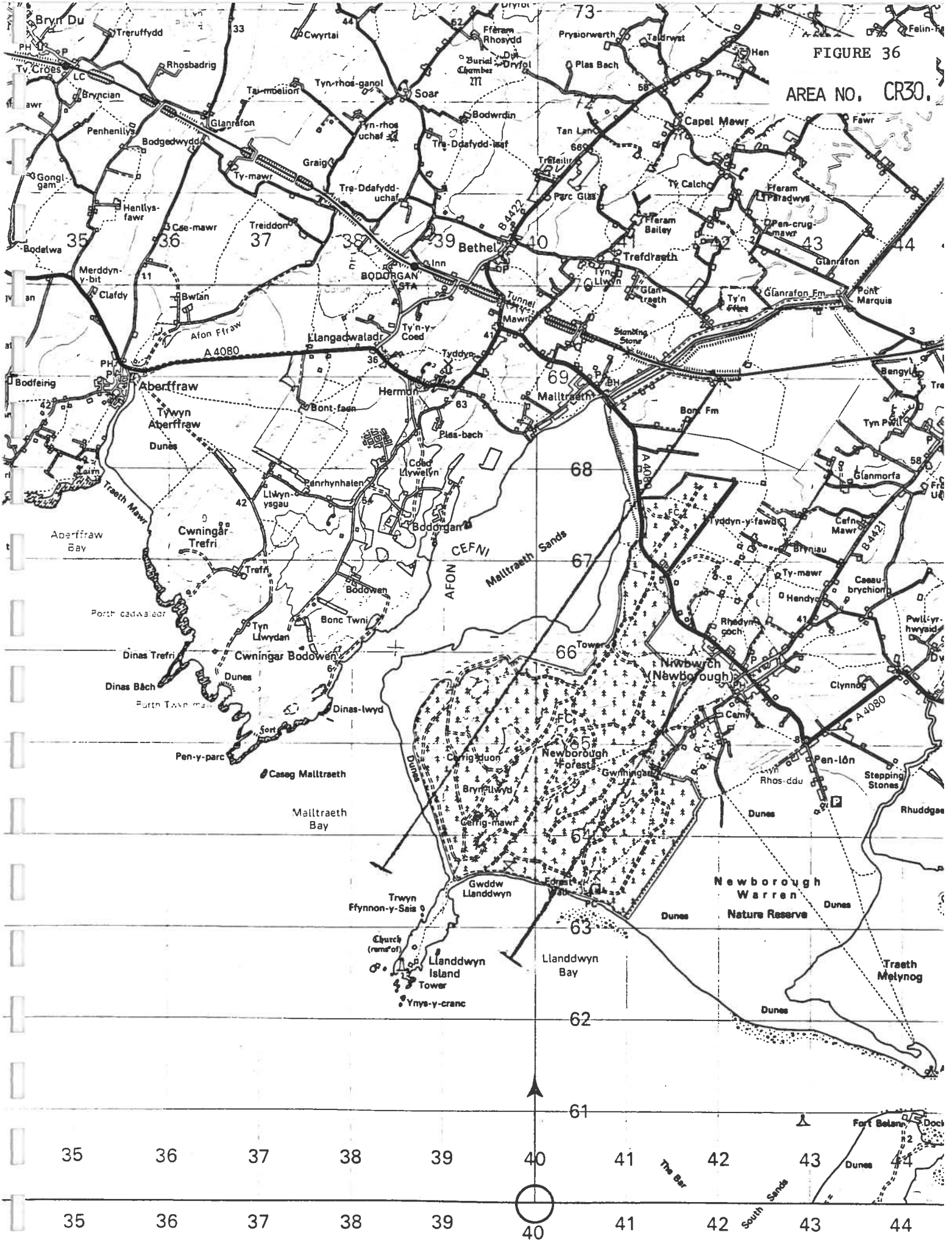


FIGURE 35/1


Broomwell
Kirkton of Monikie
Spiral Wood
Guildyden
Monikie
Craigton
Old Quarry
Lovehall
Denhead
Wellbank
Shank of Omachie
North Kingennie
Mattocks
Woodside
Cunmont
Newbigging
Omachie
Drumsturdy
Templehall
Murroes
Kingennie House
St Bride's Ring
South Kingennie
Ethiebeaton
Hillock
Pitkerro
Ardownie
Ashbank
Ashludie Fm
Hospl
Balmossie
Grange of Monifieth
Balmossie Mill
Weir
Barnhill
Monifieth
Monifieth Sands
Lady Bank
Castle
Denfind Brae
Denfind
The Law
Brae of Downie
Mains of Panmure
Pitdirlie Moor Plantation
Quarry
Predirlie
Old Downie
New Downie
Downieken
Souterrain
Carlungie
Downie Mill
Travebank
Upper Victoria
Lower Balmachie
Balmachie
Heugh-heads
Panmure Gardens
Auchrenni
Camus's Cross
Panmure Testimonial
Mains of Ravensby
Ravensby Ho
Pitskelly
Viewbank
Cemy
Grange of Barry
Woodhill Ho
Greenlawhill
Cotside
Barry
Mains of Ardestie
Balhungie
West Cotside
Lucknow
Lochside
CH
BARRY LINKS STA
Dolmore
Works
Golf Course
Danger Area
Range
Buddon
Buddon Camp
Links
Ranges
Barry Links
DANGER AREA
Barry Camp
St Helena
Barry Sands
Sandy Dens
High Lighthouse (disused)
Low Lighthouse (disused)
Danger Area
BUDDON
A92(T)
A930
B961
B962
MS
2
B


The Pile
AYPORT
Lucky Beacon
Green Scalp
Abertay Sands
Lundin Br
Mill
RY-PORT-ON-CRAIG
Tentsmuir Point Nature Reserve
Shanwell
Tower
Morton
Fetterdale
Tower
Sands
(numbered in priority)
(lettered in priority)
2 MAIN AREA OF INTEREST
B MAIN TARGET WITHIN AREA



The figures in blue along this side of the map are EASTINGS and must be quoted first when giving a grid reference

25' 20'

SCALE 1:50 000

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase ..2....

Area No. and Name:	2 ROTHAMSTED.	Map Sheet Nos. O/S:	-
Flying Height:	2600	Direction Flown:	NE
Flight Conditions:	Slight haze 4/8 cloud 3500	No. of Lines:	2
No. of 9" x 9" photo prints:	3	No. of Scan Lines:	1800
Film Forward Overlap (%):	60	No. of CCTs:	1
Ground Speed (knots):	150	Scan Speed rps:	50
Time Flown (GMT):	1525-1526 1604-1605.	Tape Footage:	108
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase ..1....

Area No. and Name:	3 LOCH LEVEN	Map Sheet Nos. O/S:	-
Flying Height:	13200	Direction Flown:	NW
Flight Conditions:	Initially clear 3/8 cloud 4000	No. of Lines:	1
No. of 9" x 9" photo prints:	5	No. of Scan Lines:	1200
Film Forward Overlap (%):	60	No. of CCTs:	1
Ground Speed (knots):	150	Scan Speed rps:	12.5
Time Flown (GMT):	0911-0913	Tape Footage:	58
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase ...1+3...

Area No. and Name:	5 SWANSEA BAY.	Map Sheet Nos. O/S:	-
Flying Height:	9650 13000	Direction Flown:	W
Flight Conditions:	Good, bright, some haze, zero cloud.	No. of Lines:	9/4
No. of 9" x 9" photo prints:	59/42	No. of Scan Lines:	43,100
Film Forward Overlap (%):	60	No. of CCTs:	14
Ground Speed (knots):	170/140	Scan Speed rps:	12.5
Time Flown (GMT):	0903-1002 1102-1105 1224-1302 1356-1400 1509-1558.	Tape Footage:	2130
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase ...2...

Area No. and Name:	5B BOSHERTON LAKES	Map Sheet Nos. O/S:	-
Flying Height:	1650 2500	Direction Flown:	SE/S
Flight Conditions:	2/8 -7/8 cloud at 3500 otherwise bright/smooth.	No. of Lines:	6
No. of 9" x 9" photo prints:	12	No. of Scan Lines:	11,200
Film Forward Overlap (%):	60	No. of CCTs:	3
Ground Speed (knots):	150/100	Scan Speed rps:	50
Time Flown (GMT):	1025-1038 1216-1222	Tape Footage:	713
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase 1+2+3

Area No. and Name:	6 THE WASH.	Map Sheet Nos. O/S:	-
Flying Height:	6600	Direction Flown:	NW/SE
Flight Conditions:	1/8-3/8 cloud at 3000 and building, otherwise clear zero cloud haze.	No. of Lines:	3/3/3.
No. of 9" x 9" photo prints:	63/21/39	No. of Scan Lines:	32,100
Film Forward Overlap (%):	60	No. of CCTs:	10
Ground Speed (knots):	160/110	Scan Speed rps:	25 12.5
Time Flown (GMT):	1713-1733 0946-1002 1605-1623.	Tape Footage:	1792.
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase 1

Area No. and Name:	10 LLANILAE	Map Sheet Nos. O/S:	-
Flying Height:	13000	Direction Flown:	N/S
Flight Conditions:	Good.	No. of Lines:	4
No. of 9" x 9" photo prints:	30	No. of Scan Lines:	9,700
Film Forward Overlap (%):	60	No. of CCTs:	6
Ground Speed (knots):	170	Scan Speed rps:	12.5
Time Flown (GMT):	1023-1044 1319-1328	Tape Footage:	534.
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase ...1+3...

Area No. and Name:	11 BALLATER.	Map Sheet Nos. O/S:	-
Flying Height:	6500 13000	Direction Flown:	E/W
Flight Conditions:	Initially clear. Dull/ Slight haze. 3/8 cloud 4000.	No. of Lines:	3/3
No. of 9" x 9" photo prints:	13/28	No. of Scan Lines:	11,300
Film Forward Overlap (%):	60	No. of CCTs:	4
Ground Speed (knots):	130/120	Scan Speed rps:	12.5
Time Flown (GMT):	0841-0844 1000-1021	Tape Footage:	611
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase ...1...

Area No. and Name:	12 SOUTHAMPTON	Map Sheet Nos. O/S:	-
Flying Height:	2600 6000	Direction Flown:	NE
Flight Conditions:	3/8 cloud 3000. Haze, turbulance 1/8-3/8 cloud 3000.	No. of Lines:	2
No. of 9" x 9" photo prints:	16	No. of Scan Lines:	3900
Film Forward Overlap (%):	60	No. of CCTs:	2
Ground Speed (knots):	130	Scan Speed rps:	50 25
Time Flown (GMT):	0855-0913	Tape Footage:	202
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase ...2...

Area No. and Name:	12/1 MONKS BROOK.	Map Sheet Nos. O/S:	-
Flying Height:	2700	Direction Flown:	N/NE
Flight Conditions:	1/8 4/8 cloud 3000 bright but hazy	No. of Lines:	3
No. of 9" x 9" photo prints:	6	No. of Scan Lines:	4,300
Film Forward Overlap (%):	60	No. of CCTs:	2
Ground Speed (knots):	135/150	Scan Speed rps:	50
Time Flown (GMT):	0937-0942 0922-0923	Tape Footage:	249.
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase ..1+2..

Area No. and Name:	12/2 CHANDLERS FORD.	Map Sheet Nos. O/S:	-
Flying Height:	3300 6600	Direction Flown:	NE/SW
Flight Conditions:	haze poor lumination 2/8 cloud 3800. Variable cloud 1/8 3/8	No. of Lines:	6/3
No. of 9" x 9" photo prints:	32/10	No. of Scan Lines:	20,100
Film Forward Overlap (%):	60	No. of CCTs:	7
Ground Speed (knots):	155/170	Scan Speed rps:	50 25 12.5
Time Flown (GMT):	1130-1142 1345-1412 0924-0947.	Tape Footage:	1128
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase 1+2+3..

Area No. and Name:	13 NEW FOREST.	Map Sheet Nos. O/S:	-
Flying Height:	2600 2700	Direction Flown:	N/S NE/SW
Flight Conditions:	3/8 cloud 3000. Slight haze at 3200. 4/8 cloud 5000 haze/smoke 3/8 cloud 4000 dull.	No. of Lines:	10/10/14
No. of 9" x 9" photo prints:	189/81/151	No. of Scan Lines:	155,800
Film Forward Overlap (%):	60	No. of CCTs:	50
Ground Speed (knots):	130/115 130/150	Scan Speed rps:	50
Time Flown (GMT):	0929-1016 1116-1137 0956-0958 0847-0921	Tape Footage:	6796
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase ...2...

Area No. and Name:	13 B CHESIL BEACH.	Map Sheet Nos. O/S:	-
Flying Height:	5000 6600	Direction Flown:	SW/NE
Flight Conditions:	Clear bright 1/8-3/8 5000.	No. of Lines:	4
No. of 9" x 9" photo prints:	30	No. of Scan Lines:	10,400
Film Forward Overlap (%):	60	No. of CCTs:	5
Ground Speed (knots):	125	Scan Speed rps:	25
Time Flown (GMT):	1020-1045	Tape Footage:	507
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase 1+2+3

Area No. and Name:	15 IRISH SEA	Map Sheet Nos. O/S:	-
Flying Height:	5000 13000	Direction Flown:	E/W N/S NW/SE
Flight Conditions:	Haze. Good. 6/8 cloud. 5500. Dull clear with 7/8 cloud at 18000.	No. of Lines:	6/9/13
No. of 9" x 9" photo prints:	93/225/77	No. of Scan Lines:	229,500
Film Forward Overlap (%):	60	No. of CCTs:	49
Ground Speed (knots):	160/150/140	Scan Speed rps:	25 12.5
Time Flown (GMT):	1121-1156 1217-1243 0942-1135 1013-1229	Tape Footage:	7552
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase 1

Area No. and Name:	15ii RIVER CONWAY.	Map Sheet Nos. O/S:	-
Flying Height:	13000	Direction Flown:	N/S
Flight Conditions:	Zero cloud, bright but some haze.	No. of Lines:	2
No. of 9" x 9" photo prints:	-	No. of Scan Lines:	6,600
Film Forward Overlap (%):	60	No. of CCTs:	2
Ground Speed (knots):	160	Scan Speed rps:	12.5
Time Flown (GMT):	1248-1301	Tape Footage:	340
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase 2+3

Area No. and Name:	28 M.L.	Map Sheet Nos. O/S:	-
Flying Height:	1650 2500 2600 2700.	Direction Flown:	N/S S NE NW.
Flight Conditions:	Clear some cloud at 3000. 2/8 cloud at 3500 Bright, 3/8 cloud at 3000. Zero cloud. V. Hazy	No. of Lines:	3/22
No. of 9" x 9" photo prints:	47/107	No. of Scan Lines:	48,500
Film Forward Overlap (%):	60	No. of CCTs:	19
Ground Speed (knots):	120/140	Scan Speed rps:	50
Time Flown (GMT):	1036-1121 0930-0935 1314-1317 1431-1432 1524-1527.	Tape Footage:	2134.
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase 1+3

Area No. and Name:	29. FURSE BROOK.	Map Sheet Nos. O/S:	-
Flying Height:	3300 6600	Direction Flown:	N/S NE
Flight Conditions:	Haze, poor lumination 2/8 clouds 3800. Zero cloud. V. Hazy.	No. of Lines:	3/9
No. of 9" x 9" photo prints:	49/36	No. of Scan Lines:	29,200
Film Forward Overlap (%):	60	No. of CCTs:	15
Ground Speed (knots):	150/120	Scan Speed rps:	25 12.5
Time Flown (GMT):	1039-1107 1532-1553 1007-1027.	Tape Footage:	1610.
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase 2+3

Area No. and Name:	30 BANGOR.	Map Sheet Nos. O/S:	-
Flying Height:	2400 6000	Direction Flown:	S NE
Flight Conditions:	1/8-2/8 cloud at 2500. Clear.	No. of Lines:	2/1
No. of 9" x 9" photo prints:	3/17	No. of Scan Lines:	12,000
Film Forward Overlap (%):	60	No. of CCTs:	5
Ground Speed (knots):	150/140	Scan Speed rps:	50 25
Time Flown (GMT):	1235-1242 1540-1543.	Tape Footage:	626
Research Team Availability:	1/N/A	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase 3

Area No. and Name:	30B. ABER.	Map Sheet Nos. O/S:	-
Flying Height:	2700	Direction Flown:	E
Flight Conditions:	Zero cloud some haze/ bright.	No. of Lines:	1
No. of 9" x 9" photo prints:	5	No. of Scan Lines:	1600
Film Forward Overlap (%):	60	No. of CCTs:	1
Ground Speed (knots):	140	Scan Speed rps:	50
Time Flown (GMT):	1549-1550.	Tape Footage:	83
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase 3

Area No. and Name:	31 SUTTON BONNINGTON.	Map Sheet Nos. O/S:	-
Flying Height:	1650 3300 6000 5000	Direction Flown:	N
Flight Conditions:	Some haze/bright, cloud at 3000. 3/8. Very hazy, bright, zero cloud.	No. of Lines:	9
No. of 9" x 9" photo prints:	9	No. of Scan Lines:	8300
Film Forward Overlap (%):	60	No. of CCTs:	7
Ground Speed (knots):	110/120/140	Scan Speed rps:	50 25 12.5
Time Flown (GMT):	1250-1259 1030-1119	Tape Footage:	507
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft:	N.E.R.C. Navajo Chieftain G-BBXX
Camera:	Wild RC8. wide angle 6" 15 Vag 396 lens
Scanner:	Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase 1

Area No. and Name:	32R. SWINDON.	Map Sheet Nos. O/S:	-
Flying Height:	1500 2600	Direction Flown:	NW
Flight Conditions:	Clear bright 3/8 cloud 3000.	No. of Lines:	2
No. of 9" x 9" photo prints:	-	No. of Scan Lines:	2400
Film Forward Overlap (%):	60	No. of CCTs:	2
Ground Speed (knots):	105/130	Scan Speed rps:	50
Time Flown (GMT):	1542-1555	Tape Footage:	144
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft:	N.E.R.C. Navajo Chieftain G-BBXX
Camera:	Wild RC8. wide angle 6" 15 Vag 396 lens
Scanner:	Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase ...2.....

Area No. and Name:	CR1.1. PLAS GOGERDDAN	Map Sheet Nos. O/S:	-
Flying Height:	3300	Direction Flown:	S
Flight Conditions:	Fairly bright smooth variable cloud 2/8-7/8 at 3500 zero cloud bright.	No. of Lines:	2
No. of 9" x 9" photo prints:	13	No. of Scan Lines:	6,200
Film Forward Overlap (%):	60	No. of CCTs:	3
Ground Speed (knots):	110/150	Scan Speed rps:	25
Time Flown (GMT):	1246-1306.	Tape Footage:	369.
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft:	N.E.R.C. Navajo Chieftain G-BBXX
Camera:	Wild RC8. wide angle 6" 15 Vag 396 lens
Scanner:	Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase ...2.....

Area No. and Name:	CR1.2. MORFA MAWR.	Map Sheet Nos. O/S:	-
Flying Height:	3300 3500	Direction Flown:	SW E
Flight Conditions:	Fairly bright. 2/8-7/8 cloud at 3500.	No. of Lines:	2
No. of 9" x 9" photo prints:	5/4	No. of Scan Lines:	1900
Film Forward Overlap (%):	60	No. of CCTs:	4
Ground Speed (knots):	120/110	Scan Speed rps:	25
Time Flown (GMT):	1452-1456.	Tape Footage:	110
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft:	N.E.R.C. Navajo Chieftain G-BBXX
Camera:	Wild RC8. wide angle 6" 15 Vag 396 lens
Scanner:	Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase 2+3

Area No. and Name:	CR1.3. BRONYDD MAWR.	Map Sheet Nos. O/S:	-
Flying Height:	3000	Direction Flown:	NE
Flight Conditions:	Zero cloud Bright some haze.	No. of Lines:	2
No. of 9" x 9" photo prints:	8	No. of Scan Lines:	2300
Film Forward Overlap (%):	60	No. of CCTs:	2
Ground Speed (knots):	110	Scan Speed rps:	25
Time Flown (GMT):	1400-1406.	Tape Footage:	432
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8, wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase 2

Area No. and Name:	CR2. WELLES BOURNE.	Map Sheet Nos. O/S:	-
Flying Height:	2650	Direction Flown:	N
Flight Conditions:	Clear. 1/8-3/8 Building cloud at 3000.	No. of Lines:	3
No. of 9" x 9" photo prints:	5	No. of Scan Lines:	15,100
Film Forward Overlap (%):	60	No. of CCTs:	4
Ground Speed (knots):	120	Scan Speed rps:	50
Time Flown (GMT):	1144-1200 1145-1152.	Tape Footage:	922
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8, wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985 SURVEY

Phase 3

Area No. and Name:	CR3.1. GLEN SAUGH.	Map Sheet Nos. O/S:	-
Flying Height:	13500	Direction Flown:	N
Flight Conditions:	Bright/clear with 1/8 cloud at 5000.	No. of Lines:	1
No. of 9" x 9" photo prints:	-	No. of Scan Lines:	1200
Film Forward Overlap (%):	60	No. of CCTs:	1
Ground Speed (knots):	130	Scan Speed rps:	12.5
Time Flown (GMT):	1340-1342.	Tape Footage:	63.
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft:	N.E.R.C. Navajo Chieftain G-BBXX
Camera:	Wild RC8. wide angle 6" 15 Vag 396 lens
Scanner:	Daedalus AADS 1268.11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase 3

Area No. and Name:	CR3.2. SOURHOPE.	Map Sheet Nos. O/S:	
Flying Height:	8000	Direction Flown:	W
Flight Conditions:	3/8 cloud 4000, dull, slight haze.	No. of Lines:	1
No. of 9" x 9" photo prints:	7.	No. of Scan Lines:	1900
Film Forward Overlap (%):	60	No. of CCTs:	1
Ground Speed (knots):	140	Scan Speed rps:	12.5
Time Flown (GMT):	1253-1255	Tape Footage:	94.
Research Team Availability:	1/N/A.	"S" Bend Correction:	YES

Aircraft:	N.E.R.C. Navajo Chieftain G-BBXX
Camera:	Wild RC8. wide angle 6" 15 Vag 396 lens
Scanner:	Daedalus AADS 1268.11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

DETAILS OF AREAS SURVEYED

1985

1985 SURVEY

Phase 3

Area No. and Name: GR3.3. DUNDEE.

Flying Height: 13200

Flight Conditions: Dull haze, 4000. cloud

No. of 9" x 9" photo prints: 2

Film Forward Overlap (%): 60

Ground Speed (knots): 130

Time Flown (GMT): 1504-1505

Research Team Availability: 1/N/A.

Map Sheet Nos. O/S: -

Direction Flown: N

No. of Lines: 1

No. of Scan Lines: 1200

No. of CCTs: 1

Scan Speed rps: 12.5

Tape Footage: 64

"S" Bend Correction: YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder

---

Phase 3

Area No. and Name: G.10. NEWBORO FOREST.

Flying Height: 5000

Flight Conditions: Some haze

No. of 9" x 9" photo prints: 16

Film Forward Overlap (%): 60

Ground Speed (knots): 150

Time Flown (GMT): 1524-1532.

Research Team Availability: 1/N/A.

Map Sheet Nos. O/S: -

Direction Flown: NE

No. of Lines: 2

No. of Scan Lines: 4400

No. of CCTs: 1

Scan Speed rps: 25

Tape Footage: 236

"S" Bend Correction: YES

Aircraft: N.E.R.C. Navajo Chieftain G-BBXX

Camera: Wild RC8. wide angle 6" 15 Vag 396 lens

Scanner: Daedalus AADS 1268 11 channel Thematic Scanner with AADS 1840 film converter unit and Sabre III tape recorder